

# The Iron Age

A Review of the Hardware and Metal Trades.

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## Blowing Engines for Krupp's Steel Works at Essen.

We present herewith an unusually beautiful illustration of a pair of exceedingly fine blowing engines constructed by Messrs. W. & J. Galloway & Sons, Knott Mill Works, Manchester, for Herr Krupp, Essen, which appear to offer a number of novel features, and have evidently been designed with a view of getting as simple, substantial, and accessible an arrangement of parts as possible. The main framing consists of massive castings, and rests directly on the ashlar or brick foundation. To the underside of their frame are attached the steam cylinders, which, in the engine illustrated, are 40 in. bore and 5 ft. stroke. The pistons of these cylinders are fitted with cast iron trunks of such a diameter as to reduce the area on the top side of the piston sufficiently to compensate for the weight of the blowing piston's rods, cranks, etc. Each trunk is connected directly to the piston-rod, which is of ample strength to contend with the strain caused by having the connecting rod fixed a little to one side of the center line of engine. The position of this rod is no doubt an innovation, but the makers consider that the advantages gained in compactness and fewness of parts more than compensate for any objectionable feature, as the connecting rod has comparatively little to do; and practically it has been found that after three years' operation they are in as good condition as when originally set to work. The slide bars are of V section, so that by setting them up in the ordinary way they take up all lateral play. The blowing cylinders are carried on the top of the standards, and in the arrangement of their valves is embodied the makers' patent.

The valves are shown in detailed drawing on page five of this issue. It will be seen from Figs. 1 and 2 that they consist of circular discs lying upon grids, varying from 6 in. to 8 in. in diameter or more, according to the size of the engine, arranged in an annular chest round each end of each blowing cylinder. One suction valve and one delivery valve are secured on a single central spindle, as in Fig. 3 and 4, and by unscrewing the nut on the top of this spindle the pair can be taken out in a very few moments for examination. The valves rise and fall bodily on the grids, and so are not injured by the constant bending backward and forward to which the ordinary valves of the usual construction are subjected. By the improved arrangement of valves the minimum of clearance at the end of stroke is obtained, and it also allows the castings of cylinder and chests to be made in a very simple form. The air for the delivery valves is led into an annular passage, which in the smaller size of engines is made of cast iron, and in the larger size of wrought iron, large enough to admit a man passing round. The illustration represents a pair of non-condensing engines, but in cases where it is desirable to use condensers the air pump is very readily worked from a lever keyed on to a rocking shaft carried by the standards, and connected by a short link to the cross head.

The steam cylinder is fitted with piston valves, and to prevent grooving, to which ordinary piston valves are liable, provision is made to give these valves a slow revolving motion, which preserves them in most excellent condition, and they work practically frictionless, though perfectly steam tight. In cases where

## The Hudson River Suspension Bridge—Laying the Corner-Stone at Poughkeepsie.

The occasion of the laying of the corner-stone of the new bridge that is to span the Hudson River at Poughkeepsie, called forth a

they were received by Mayor Eastman, P. F. Dickinson, secretary of the Bridge Company, and others.

Soon after 12 o'clock the various organizations which were to take part in the celebration formed in Market street. The Grand Marshal was Col. George Parker, whose aids were

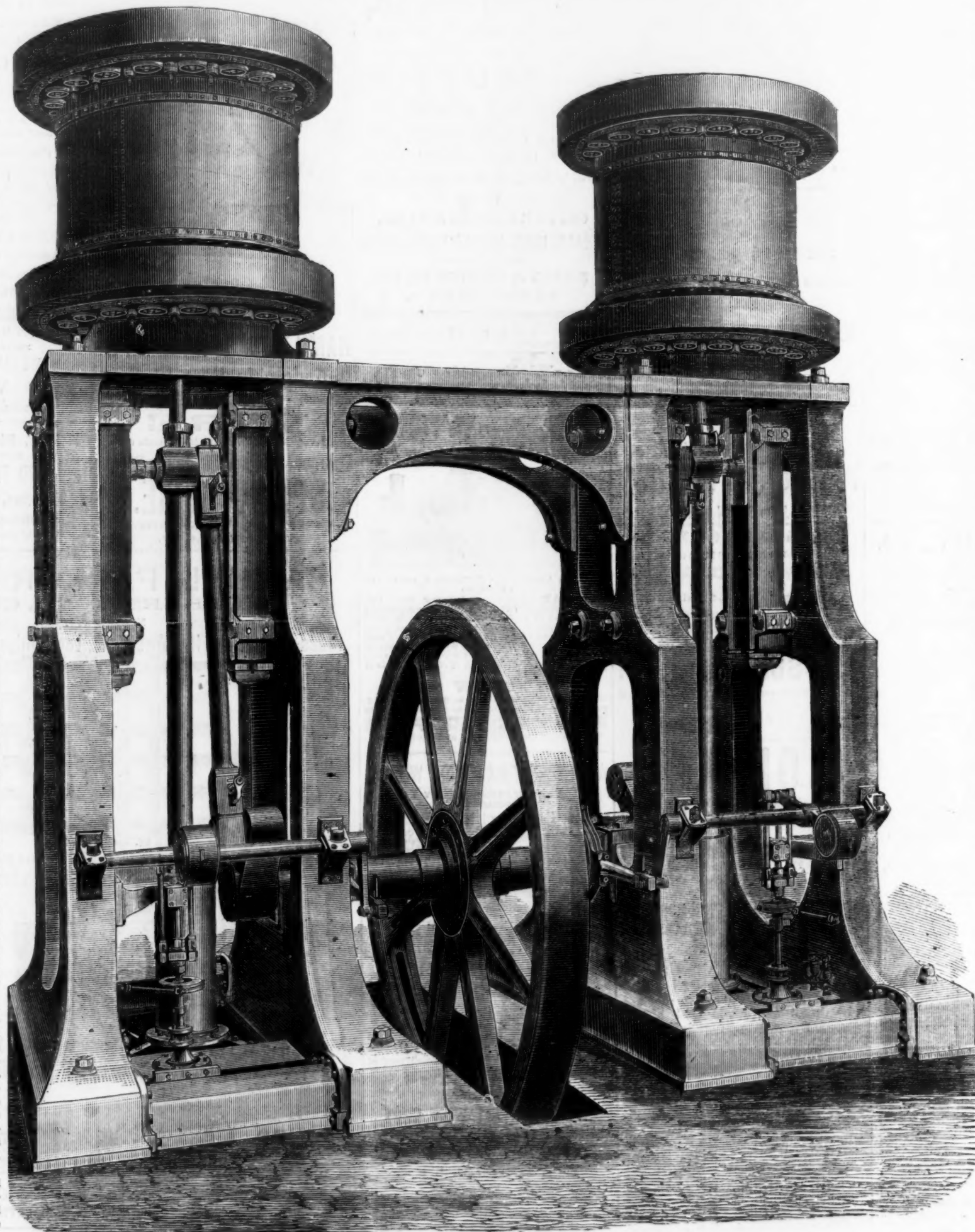
mandery, No. 43, Knights Templars, and 50 carriages, occupied by invited guests. The procession passed on to Reynold's Hill, on the summit of which the eastern tower of the bridge is to be erected, and the corner-stone of which was to be laid. After the Grand Chaplain had invoked the divine blessing on the success of

the enterprise, the various working tools were distributed by the Grand Master to the Senior and Junior Wardens. The stone was lowered into place, tested and found to be true. The offerings of wine, corn, and oil were made, and the ceremonies were closed by the singing of an ode. In the back part of the stage was a large colored map showing the route of the proposed new railroad, the bridge, and the railroad connections. The parquet was floored over, and three large tables were set. About 800 persons sat down to dinner.

Mayor Eastman welcomed the guests of the city, and especially thanked those from the Key Stone State, who represented the leading railroad interests of the nation, for the aid they had extended to the enterprise. Cyrus Swan read a number of letters of regret, including one from the Hon. Hamilton Fish, and another from Gov. Dix. The first regular toast, "The Bridge," was assigned to A. L. Dennis, president of the Bridge Company; but as he laughingly assured his auditors that he had only agreed to furnish the materials for the bridge, while the Mayor had promised to do all the talking, the latter was obliged to take his place. He sketched the history and prospects of the enterprise, and closed by calling upon Theodore Cuyler, of Philadelphia, to speak in honor of the second toast. "The State of Pennsylvania; her freights of coal and ore." Among the other toasts were, "New England—her manufactures and population," Mayor Cullen, of Boston; "the State of New York," Judge H. A. Nelson; "the railway system connecting New England and the West," the Hon. Homer Ramsdell.

The dimensions of the proposed bridge are as follows: Height of railroad track above the water, 190 feet; length of water span, 3420 feet; land approaches, 1080 feet; distance between piers, 500 feet; height of piers from bed of river, 210 feet; total weight of masonry in structure, 2,000,000 tons; total weight of iron, 9000 tons. It is claimed that this bridge will form an important link in the new central trunk line from the coal fields to New England and to New York city, and from the West to the East by the Pennsylvania Railroad, Erie Railway, Midland Railroad and connections in the West, and Poughkeepsie and Eastern Railroad, Connecticut Western Railroad, and the Boston, Hartford and Erie Railroad and connections in the East.

The apparatus designed by the Astronomer Royal to represent the transit of Venus consists of an opening cut in a screen, through which the rays of the sun are thrown by a mirror. Across this opening is a glass slide, on which a black disk, to represent Venus, is drawn by clock work.



BLOWING ENGINES FOR KRUPP'S STEEL WORKS

economy in fuel is a desideratum an additional expansion valve is provided in a simple and efficient manner. The position of the air pump and steam cylinder below the floor is very favorable to keeping the steam and exhaust pipes out of the way, and the engine house comparatively cool. The piston valves, etc., are also all easily accessible.

A rolling mill for re-rolling old rails has been projected at Cheyenne, Wyoming Territory.

large gathering on Wednesday last. The trains on the Hudson River and Poughkeepsie and Eastern Railroads came in laden with visitors. A special train from Hartford, containing Mayor H. C. Robinson, the members of the Common Council, and a number of prominent citizens of Hartford, came through from that city over the Poughkeepsie and Eastern Railroad in three hours and 40 minutes, the quickest time made over the line. The invited guests gathered at the Morgan House, where

Robert Sandford, Pelton C. Husted, H. S. Jewett, E. Parker, George Carson, Egbert Smith, James Mabbett. The procession included a detachment of veteran volunteers under the command of Capt. Wm. Platt, 21st Regiment, four fire companies, students at Eastman College, Knights of Pythias, United Order of American Mechanics, St. Peter's T. A. B. Society, German Turners, Independent Order of Odd-Fellows, Poughkeepsie Lodge, No. 228, F. & A. M.; Poughkeepsie Com-



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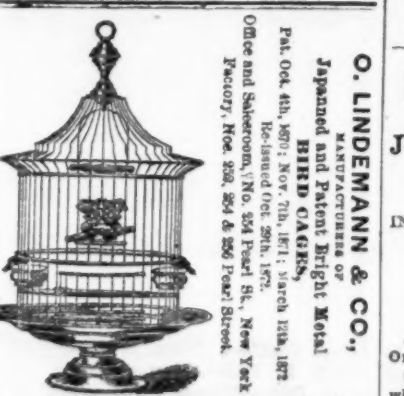
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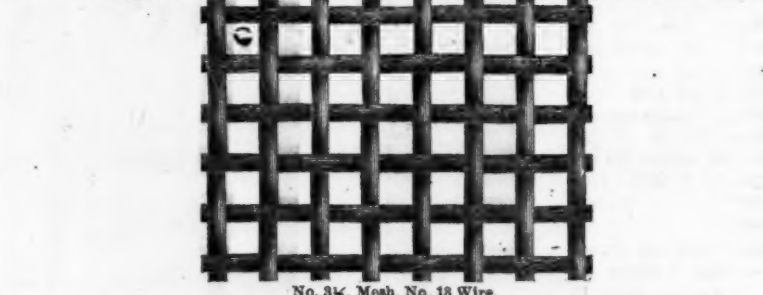
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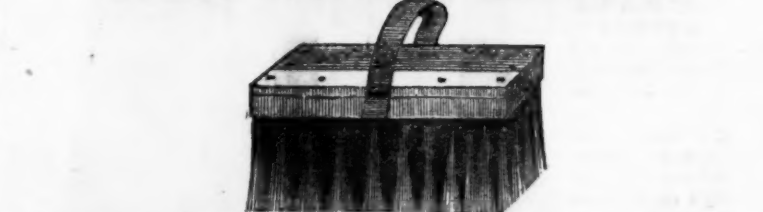
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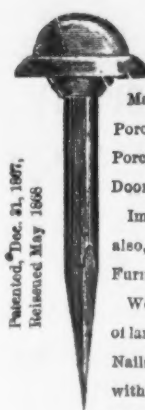
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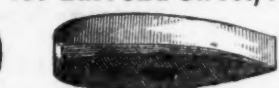
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Failure and Conditions of Success.*

It is probably known to most of our readers that very few, if any, kinds of business require so much care as that of making good files, since in every operation they can be spoiled. In the forging care must be taken with each file that it is not overheated. The annealing is also to be carefully and closely watched, else the same result will follow. Grinding, too, is important, as care must be used to get all the scale or oxide off, and, also, that each file be ground true and its surface not burned, and so rendered incapable of being hardened. In the cutting files may be spoiled by miss-cuts, shallow-cuts or dull-cuts. In hardening the same great care must be observed, as here, too, overheating will prove fatal to their wearing qualities. And, finally, if they be perfect at the completion of this process, they may be easily spoiled by careless handling or by allowing them to rub against each other.

These are a few of the difficulties with which all file manufacturers, whether by hand or machinery, must contend to a greater or less extent. What, then, must be the obstacles to be overcome when to these difficulties are added those attending the inventing and perfecting of machinery to perform these various operations, not only on one pattern file, but on the hundreds of patterns required to suit the various wants of the public, and all to be done by comparatively unskilled labor?

A common notion has long existed, and still prevails, that if a person invents a file cutting machine, he is entitled to all the capital he requires to apply it, beside a heavy bonus for his patents, and to immediately commence the manufacture of files by machinery; but if capitalists would but consider how much remains to be done before such enterprises will become, or can be made, self-supporting, they would, at least, hesitate. Some there are, however, who can see a fortune in a patent—a simple piece of parchment, in most cases—but while a few are valuable, the greater portion are worthless.

The common practice by many who have attempted making files by machinery has been to do the difficult portion by skilled hand labor, and substitute machinery in the simpler processes. The objection to this system is that labor, imbued as it always is with the spirit of trades union opposition to machinery, is ever on the watch to charge all blame to the machines, and as the two elements are exactly opposites, one or the other must eventually give way, though in the meantime the reputation of the file must necessarily suffer.

Attempts to cut files by machinery are not new, dating back to the middle of the last century. The vast capital employed in England in the manufacture of files has very naturally led those interested to make various attempts in this direction, and numerous patents for file cutting machines have been taken out, but, until quite a recent period, attempts to work them have been failures. Since 1860 several efforts have been made, notable amongst which was the Birmingham Patent File Works, started at Birmingham with large capital, to work the cutting machinery invented by Etienne Bernot, of France. The company expended considerable sums in buildings and machinery, but in a brief period of less than three years abandoned the enterprise. The same may be said of the attempt made by the Prestons, who invested quite largely in plant and machinery near Manchester. A few years since the British Patent Hardware Co., of Manchester, with an American mechanic at its head, was organized, and introduced machines for grinding saws. They afterward adapted them to grind files, and at first ground the blanks for hand workers; but they soon found so much opposition from the trades unionists that they were obliged to apply machinery for cutting and forging, or give up the attempt altogether. This company is still running, but with what success we are unable to state.

In Sheffield, the center of the file manufacture, little has been accomplished. Early attempts were made by Turtons, and others of the more enterprising masters, to introduce machinery, but without success. The strike of 1866, however, gave renewed determination to some of the masters to again introduce machinery, and since that time a few machines have been in use. But file making by machinery in England, to any considerable extent, must be for a long time seriously impeded, as the file smiths' union is, and has ever been, one of the most obstinate, as well as most powerful, in the kingdom. In 1866, the entire file business was suspended for over six months, during which time over three thousand of these unionists were out of employment, at the command of men possessed of the same spirit and character as the notorious Broadhead who, with many other unionist leaders, were shown up in their true colors, and by their own confession, before the Parliamentary Trades Union Outrage Commission of 1866. This spirit has ever shown and made itself felt in England, and must continue to be felt, to a greater or less extent, during the present generation.

Those who have attempted the manufacture of files by machinery in this country have realized the advantage gained by having liberal minded mechanics in their employ, men who think and are never surprised at anything. These men become interested in their work and do their very best to aid in securing the best results, and are as gratified as the master himself when satisfactory results are obtained. The ultimate result of all such enterprises by machinery must be materially affected in proportion as these opposing elements enter into them, whether in America or elsewhere. Other countries have also done something in file cutting machinery, the fine and small files made by Raoul and Frontal et Cie, of France, as also

those made by Vautier, Baumer, Grobel, and others, of Switzerland, are said to be made by machinery, and while it is certain that these files have acquired a reputation not exceeded by the celebrated Stubbs, yet as they are for watchmaker's and jeweller's use, they have never materially affected the heavy file business.

In the United States, file manufacturing, except such as may be done by the few English handworkers scattered throughout the country, and who are engaged principally in recutting, must eventually be done in the peculiarly American way to become a success. It is essential that machinery should be substituted for hand labor wherever such application is possible, and so applied as to use comparatively unskilled labor. Upward of 20 years ago a company was organized with a large capital under the name of "The American File Works," with a man of unusual mechanical ability at its head. They erected extensive brick buildings at Ramapo, N. Y., and made the first attempts of importance to manufacture files by machinery in America. Their files were used by some of the largest shops in the country. In a few years, however, the project was entirely abandoned.

Some years later an attempt was made in Hartford, Conn., several machines were built and started, but this enterprise was also a failure. During, or about the year 1858, the Whipple File Company started manufacturing files at Ballard Vale, Mass., with cutting machinery invented by Mr. Milton D. Whipple. Little headway was made, however, until the war broke out, when the rapid advance in gold, combined with the scarcity of English files, enabled the company to find a ready market for its entire production without difficulty. These unnatural prices and the apparent prosperity of the company soon enabled its president, Mr. W. P. Pierce, a gentleman of unusual financial ability but lacking mechanical experience, to enlarge the works from time to time, to keep pace with the growing demand. No disastrous effect was experienced until gold began to decline, when the difference between the price of English and American files, which had hitherto been growing larger, began to diminish. Then it was that the struggle began in earnest, and Mr. Pierce's real talent was required to be exerted to its utmost. Among the difficulties encountered by this enterprise, was the one, either real or imaginary, that the steel manufacturers of the old country could not, or did not, make steel good enough for Whipple files. Steel works were, therefore, erected, and larger quantities of files made, that they might be made more cheaply. In the meantime, gold continued to decline, and competition would and did continue in spite of Mr. Pierce's best calculations. It was also found that the rapid increase in production was not all gain, as the "Pemberton's" or second quality, hitherto ruinously large, and difficult to dispose of, were in a larger proportion than hitherto to the total output. The increased production, however, was still kept up, until the fall of 1869, when no more capital was to be had. The company stopped, and its property was sold at public auction. The capital stock of this enterprise at the time of its failure amounted to some \$700,000. Its liabilities were very heavy, and the effect of its failure was felt severely by its stockholders, the property being sold at ruinously low prices.

During this period other companies of considerable magnitude were started, the first of which was the American File Company, which obtained a charter during the spring of 1868. Mr. James S. Brown, a gentleman of abundant means, and a successful manufacturer of cotton machinery, took stock in the enterprise and became its manager. The cutting machinery used by this company was the Bernot, the same as started by the Birmingham Patent File Company, previously referred to. Substantial brick buildings were erected at Pawtucket, R. I., machinery built, and everything looked favorable for success. In the fall of 1864 Mr. Brown, its manager, from some cause sold out his interest and withdrew from the enterprise. The company continued until the fall of 1867, when, the outlook being anything but encouraging, the works were stopped, machinery stored, and the buildings sold to be adapted to the more lucrative business of manufacturing cotton cloths. The company continued employing a few hand workmen only, and doing comparatively little for nearly two years thereafter, when they erected cheaper wooden buildings, and again started their machinery. Numerous changes have been made in their management since they started, but a portion of their machinery is still running.

The Weed File company began operations in South Boston in the spring of 1866, with large capital. They erected extensive buildings, and displayed much energy in getting their goods into the market in an exceedingly short time thereafter. In April, 1868, however, their machinery was sold at public auction. This company made little attempt to use machinery except for cutting; the forging and grinding being done by English workmen principally, and in the peculiarly English manner.

The Nicholson File Company, of Providence, R. I., was organized in the spring of 1865, with Mr. W. T. Nicholson, the inventor of their machinery, at its head. Their substantial, brick buildings were planned to admit of enlargement from time to time as might be required. One of the first steps taken was to ascertain what had been done, not only in America but in the old country, both in files and steel, and to this end their agent spent several months in Europe, with full instructions to purchase such machinery as might be thought worthy of adoption. After nearly nine years of the closest attention by Mr. Nicholson, it is gratifying to be able to say that this company is a success, not only in a pecuniary sense, to its stockholders, but in producing first-class files, as many of our readers are undoubtedly aware. Not only do

we see the large and simple kinds, but even the smallest sizes, handled by machinery with a care and precision not excelled by the most skilled hand workers, while throughout the entire works a most complete system of inspection is maintained. The works have grown slowly, it is true, but surely, now having machinery to produce upward of seven hundred dozen files per day when in full operation. The demand for their files of late has been such that the company have not been obliged to employ travelers, which, in itself, is good evidence that these files are appreciated by the public.

In the fall of 1869, Mr. Fessenden, the former superintendent of the Whipple File Company, in company with Mr. David Blake, established what are known as the Western File Works, at Beaver Falls, Pa., having purchased the Weed and a considerable portion of the old Whipple machinery, as also some few machines, such as are in use by the Patent Hardware Company, of Manchester, Eng., started under the superintendence of Mr. Fessenden. Large buildings were erected, and a degree of activity displayed during the short time they have been running, which is worthy of success.

From the foregoing may be gathered the principal facts regarding what has been done, as also what is now doing in this important branch of manufacture. It may also convey an idea of the obstacles which must be overcome in the successful manufacture of files by machinery. In most of these attempts it would seem that the managers had entirely failed to realize the peculiarity of the position of the teeth, and the manner in which the files were to be used. The principal idea which has been developed, not only in the earlier but also in the more modern inventions made for cutting files, has been to make a machine that would alternately move the blank to be cut equal spaces during its entire length, and to provide a hammer either holding a chisel and striking a blow, or striking a chisel held by some special device, at each alternate movement of the blank. This regularity of movement, while it would produce a file with teeth as perfect as could be made by hand, has always been the chief objection to the machine file, causing the many complaints heard about "running in grooves," "chattering," &c. The regularity of the teeth so characteristic of most machine work, is not easily obtained by the hand worker, who, seated with his blank firmly held to a stone block in front of him, strikes the chisel into the blank and raises or produces the first tooth; the chisel is then lifted out of its groove, placed on the blank and slid up until it comes into contact with the tooth previously raised, when the second blow is struck and another tooth is produced, and so on. Now, if the force of these blows were alike in each case, then the spaces would be equal, but as it is utterly impossible for the most expert workman to strike the great number of blows required in the entire side of a file with exact uniformity, it will be seen that irregularity in the teeth must exist. Undoubtedly, the failure of the Whipple and Weed, as well as many of the earlier enterprises, may be traced, at least in a great measure, to the fatal defect in their machinery, of producing this extreme regularity in the files. This brings us to consider, in conclusion, the only real invention worthy of note in the file itself, which has been produced during this entire period. We refer to an invention, patented by Mr. W. T. Nicholson, of the Nicholson File Company. Mr. Nicholson saw this defect in other machine-made files, and so arranged his machinery that he could produce a file with teeth, in their spaces, conforming to the hand cut file. The article produced, the company saw fit to call it the "increment cut file," the word "increment" meaning increase. These files are not cut with a uniform depth or space, and no two spaces can be found exactly alike in the entire length of the side. The difference between this and the perfect regularity of other makes must be apparent, particularly in double cut files, as, in the one case the file cut with such extreme regularity, when put to use, will in the first inch of its movement produce channels or grooves, and these grooves will continue to be made deeper as the file is shoved along, thus producing that "grooving" and "chattering" so often complained of, while in the "increment cut file" the grooves made by the movement of the file for the first inch, will have their sides cut away as the file is moved toward the "tang" or handle, and vice versa, and while it is cutting as fast as its points permit, it is also said to cut smoother than the best hand cut of the same coarseness. The irregularity spoken of consists not only in the spaces between each tooth, but also in the heights of the teeth themselves, thereby completely removing the objections hitherto urged against machine files. The established and still increasing reputation of these files is sufficient evidence that this improvement is thoroughly appreciated.

In writing this article we have had no desire to reflect upon past or existing enterprises, but simply to give a brief recapitulation of what has been done in this and the old country, and also what is doing at the present time, to manufacture by machinery files which will compare favorably with those made by hand; and while we may not have reached the highest possible perfection in the adaptation of machinery to this delicate and difficult work, it will be seen that we have already made substantial progress in this direction.

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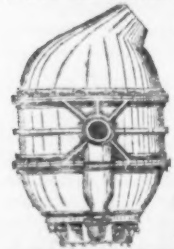
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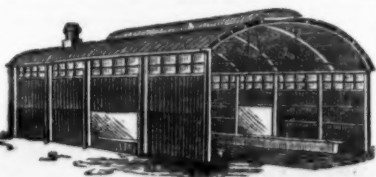
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C. C. POST, Manufac. &amp; Patentee, Burlington, Vt.

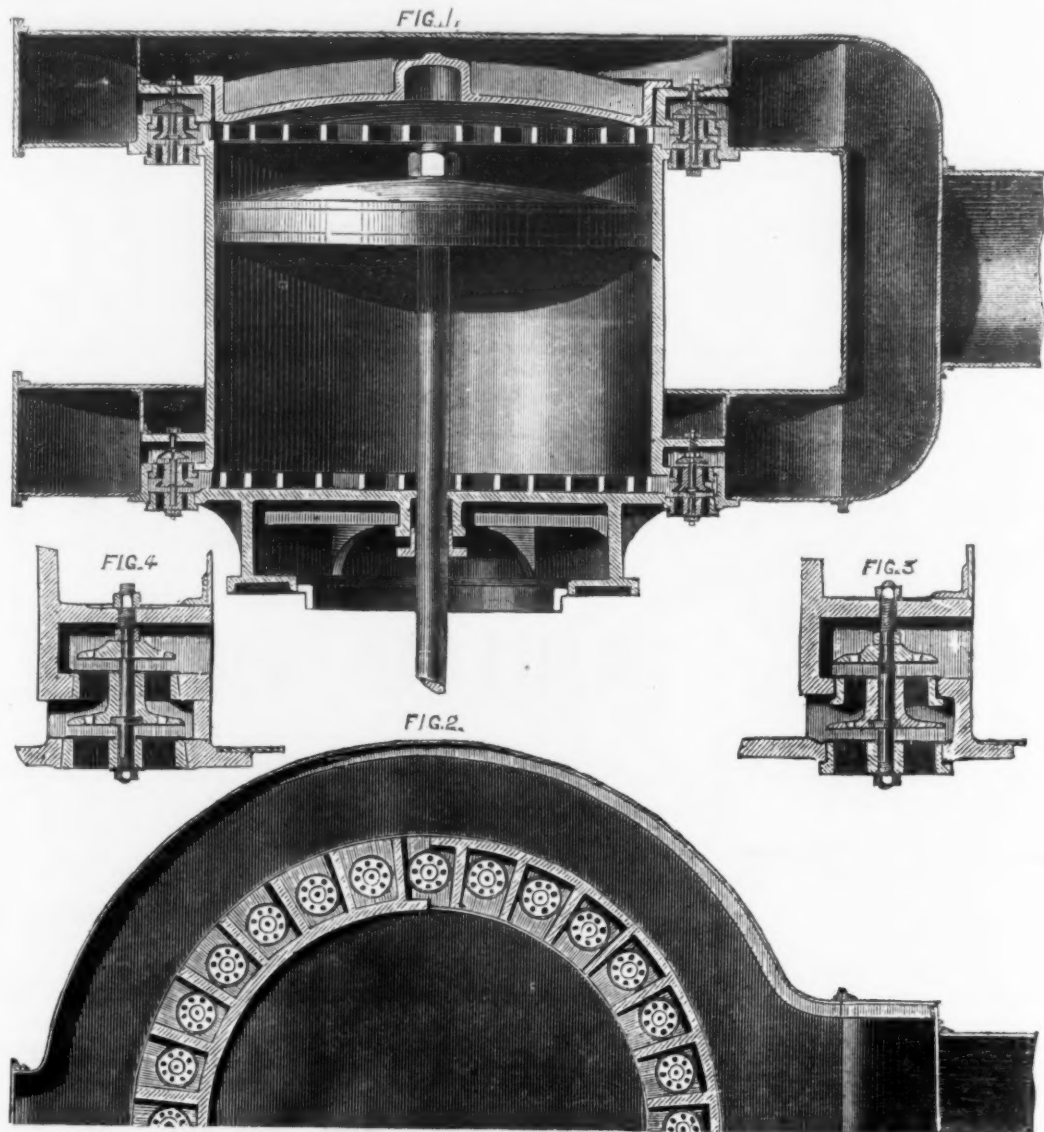
**Scientific and Technical Notes.**

A writer in the *Car Builder*, describing the difference between

ANCIENT AND MODERN BRIDGES,  
 says: The knowledge of the arch as a method of construction with stone or brick—both of them materials aptly fitted for resistance under pressure, but of comparatively no tensile strength—enabled the Romans to surpass all nations that had preceded them in the course of history in building bridges. The bridge across the Danube, erected by Apollodorus, the architect of Trajan's Column, was the largest bridge built by the Romans. It was more than three hundred feet in height, composed of twenty-one arches resting upon twenty piers, and was about eight hundred feet in length. It was, after a few years, destroyed by the Emperor Adrian, lest it should afford a means of passage to the barbarians, and its ruins are still to be seen in Lower Hungary. With the advent of railroads, bridge-building became

usual time another went to seek him, found him senseless, and he himself faintly crying for help, two others then entered, and having drawn their comrade near to the entrance fell down suffocated, the two remaining men saved the one nearest the entrance, and then losing all presence of mind, rushed about calling for help, and a founder named Norris, regardless of all danger, got out the other three men, one of whom was at the distance of eighteen, and another of twenty-five meters from the entrance; these two unfortunate men were dead. Norris has since received a gold medal for his intrepidity. The engineers could not discover exactly either the nature or source of the noxious gases which had invaded the conduit after it had been completely cooled; they think that the first of the men must have disturbed a quantity of carburetted hydrogen and carbonic oxide previously imprisoned by the tar. The second accident, very similar to the first, occurred in a conduit one meter in diameter, which conducted the hot gases of the blast fur-

method of voltaic cells, so that the secondary battery of lead plates may be charged by it. It is not necessary that the secondary couple should be kept in continuous contact with the primary exciting battery, for the former having been once charged is capable of a series of consecutive ignitions. With a secondary couple of large dimensions, having an active surface of one and a half square metres of surface, from 3000 to 4000 consecutive ignitions have been obtained. A very large number of successive ignitions may also be obtained by regulating the discharges by intervals, in consequence of the property which the leaden electrodes possess of preserving for a long time a portion of their charge. M. Plante proposes to designate his apparatus "Briquet de Saturne" (Matches of Saturn). He states that a taper is lighted by a platinum wire heated thus to a red or white heat much quicker than by any other method. The incandescence of the wire has no effect of igniting the atmosphere; there is no smoke, smell or gas given



DETAILS OF BLOWING ENGINES FOR KRUPP'S STEEL WORKS. (For Description, see page 1).

even a greater necessity than it had ever been before, and the use of iron has enabled engineers to grapple with and overcome difficulties which only fifty years ago would have been considered hopelessly insurmountable. In this modern use of iron, advantage is taken of its great tensile strength, and many iron bridges, over which enormous trains of heavily loaded cars pass hourly, look as though they were spun from gossamer threads, and yet are stronger than any structure of wood or stone would be. The chief bridges of ancient times were built as great public conveniences upon through-ways over which there was a large amount of travel, and consequently were near the cities or commercial centers which attracted such travel, and were therefore placed where they were seen by great numbers. Now, however, the connection between the chief commercial centers is made by the railroads, and these penetrate immense distances, through comparatively unsettled districts, in order to bring about the needed distribution; and in consequence many of the great railroad bridges are built in the most unfrequented spots, and are unseen by the numerous passengers who traverse them, unconscious that they are thus easily passing over specimens of engineering skill which surpass, as objects of intelligent interest, many of the sights they are traveling to see.

During the past few months two serious ACCIDENTS IN FURNACE FLUES have occurred in France, which merit passing notice—one at the steel works of Chaleassiere and the other at the Terre-Noire works—and M. de Fourcy, Inspector General of Mines, has made inquiry into their causes. At the steel works of Chaleassiere, the Martin and the reheating furnaces are fed by a gas producer, by means of a horizontal conduit formed of sheet iron, 46 meters long and 1.20 meter diameter, and supported by six hollow columns, three of which are furnished below with manholes for the removal of the soot; there are also three similar holes in the lower part of the conduit. Once a month two gangs of six men relieving each other remove the soot and tar collected, by means of scrapers with handles of various lengths; each man enters in his turn and remains within the conduit as long as his powers will allow, which is not more than five or six minutes at the utmost. The whole operation lasts between three and four hours. On the day of the accident a man not returning at the

naces to the steam boilers and heating apparatus of the blowing engines. These gases deposit matter partly in the state of powder and partly adherent to the iron sides, so that picks were obliged to be used to disengage it. In order to clean the tubes, the blast of the furnaces was stopped about once in four or five weeks, the hydraulic sealing was opened, the gas entry valves let down, and the man holes opened as well as the sight holes placed at the lower end of the main conduit. It was in cleaning the latter that the accident happened, which caused the death of one man by suffocation. M. de Fourcy remarks that in order to provide against the danger of cleaning out these great conduits of hot gases, even when thoroughly cooled, the openings should be increased in number, and especially that some should be placed in the upper sides of the conduits, so as to render the cleaning more easy from the exterior, and that being placed in alternation with the lower openings, they would give rise to currents of air which would rapidly carry off the deleterious substances that tend to disengage themselves from the deposited liquids or powders. He also suggested that experiments should be tried to clear the conduits by means of jets of air or steam obtained by means of the blowing engines or steam boilers at the works.

M. Plante has lately brought to the notice of the French Academy a curious application of secondary couplers, which he styles the

BRIQUET DE SATURNE.

The device consists of large plates of lead immersed in dilute sulphuric acid, which become electrically charged by prolonged action of any of the ordinary forms of the voltaic battery. By such means the electro-motive force of a comparatively small battery is enabled to produce some very remarkable effects. The apparatus employed by M. Plante consists of a small secondary couple, contained in an arrangement whose bottom and sides have the necessary system of communication so disposed as to inflame a platinum wire, and to ignite by the simple pressure of the finger, or by a metallic key, a combustible body such as a taper, a spirit lamp, gas, &c., placed near it. The voltaic battery used to set the apparatus in action is of an extremely simple character, consisting of three elements, having respectively a plate of zinc charged with water, and a plate of copper charged with a solution of sulphate of copper, arranged in the ordinary

off, and no danger of fire. The actual cost is very slight, being limited to the first outlay of the secondary couple, namely, that of the lead and the liquid, and the feeble current of the primary battery is equally of little expense, only requiring occasional renewal of the copper solution. The arrangement is susceptible of numerous other applications.

**Iron and Steel Imports of France.**

The official returns of the admission of iron and steel into France, to be worked up and re-exported under the special decree for that purpose, for the first nine months of the current year, supply us with the following figures:

IMPORTS.		
	1873.	1872.
Cast iron.....	Tons, 58,716	59,416
Wrought iron.....	13,325	12,804
Sheet.....	4,862	8,163
Steel.....	616	...

showing a large increase in each item.  
 The accompanying returns of the iron, steel, machinery and other articles imported under the decree respecting shipbuilding, is interesting, though it does not supply the figures for 1872:

CHIEF IMPORTS IN NINE MONTHS OF 1873.		
	Tons.	
Old iron.....	34	
Pig iron.....	738	
Wrought iron.....	8,071	
Sheet iron.....	72	
Steel in bars.....	17	
Steel in sheets.....	52	
Copper.....	1	
Brass.....	60	
Steam engines.....	6	
Other complete machines.....	9	
Detached parts of machines.....	23	
Iron tubes.....	212	
Other wrought iron goods.....	8	
Anchors.....	66	
Iron cables and chains.....	70	

We have omitted all the items of which the totals were less than one ton.

A traveler in North Carolina gives a description of a furnace built at Buckhorn during the war. This furnace, he says, was a model of its kind, being constructed at a cost of less than \$5000 in gold, and making from four to five tons of iron per day. It was stone to just above the hearth, thence up was merely a frame-work of timber, with a lining of brick, the space between being filled with packed clay. When burned by Gen. Sherman, it stood as if one solid brick. It was a success in every respect, and turned out about 300 tons of pig-iron in sixty running days, but it was managed and run by a practical Scotchman named John Colville.



Iron.

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**BESSEMER STEEL RAILS,**  
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**HORSE SHOES, HORSE NAILS,**  
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**NAILS, SPIKES,**  
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## NAILS AND BAR IRON,

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 quality iron. Guaranteed to stand specified tests.  
 Special orders taken for common iron.  
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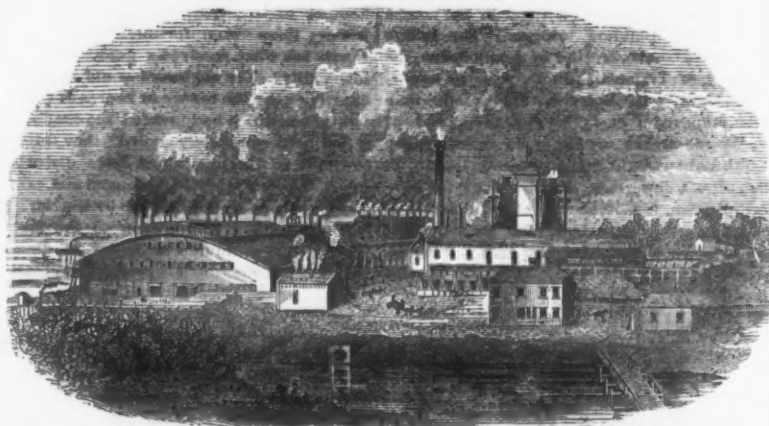
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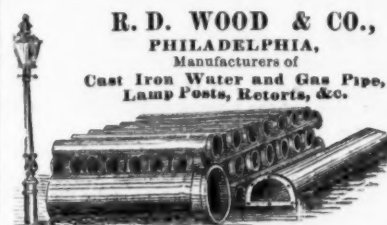
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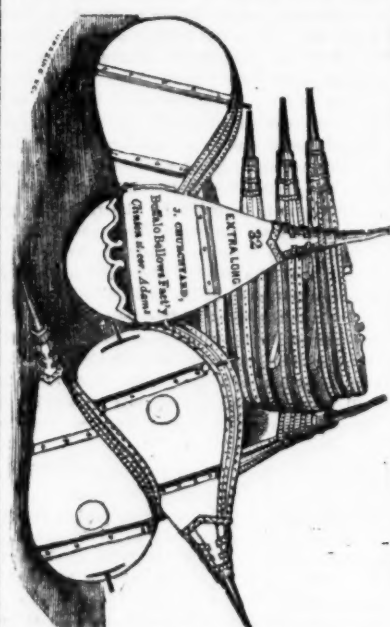


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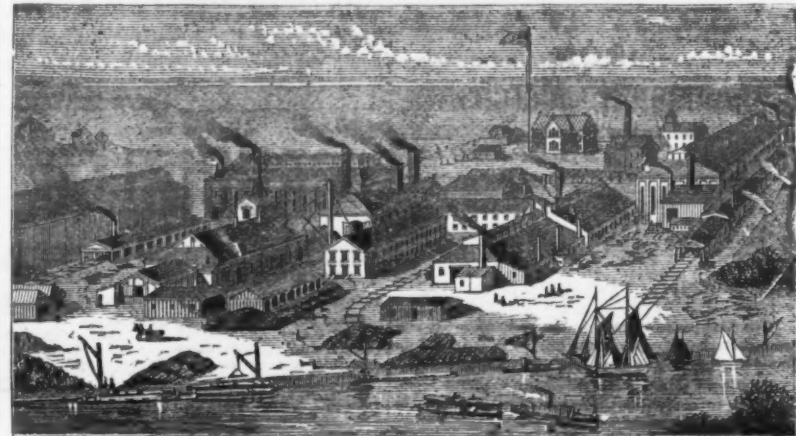
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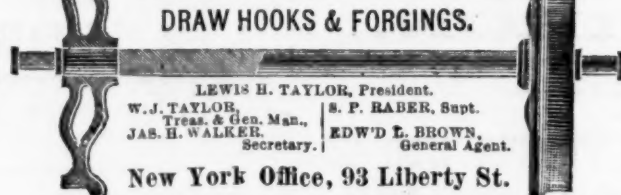
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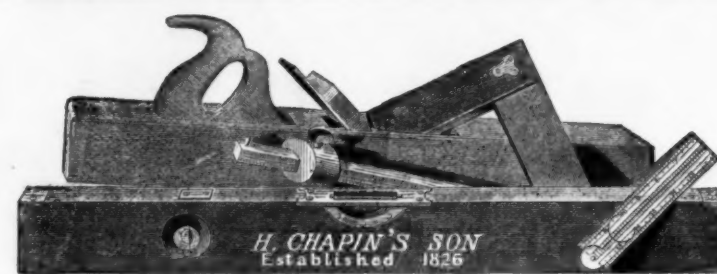
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**The Origin and Progress of Iron Smelting.**

BY ST. JOHN VINCENT DAY.

At first sight it appears out of keeping with an almost constant order, that the place and date, no less than the names of the first makers of cast iron, are not absolutely known.

When, however, we reflect upon that which we really do know concerning early methods of making iron and steel, weigh carefully the precise nature of the conditions involved under those methods, and seek out the results inevitably accruing through them as explained by the guiding light of modern chemistry, it would appear that the blast furnace, as a distinct apparatus, could scarcely at any time have consisted in a definite or sudden departure from an existing order of things; by saying which, I mean to explain, that in all probability there never was in the development of iron smelting an immediate complete change made from the method of reducing ore at once to malleable metal (the direct method), to that of first making pig or sow metal (i. e., the indirect method of the blast furnace as we practice it to day). On the contrary, the evidence which has been collected goes to show that the blast furnace was ultimately reached—as a definite and distinct apparatus for reducing iron ore quickly, and producing an easily fusible compound of iron—by its accidental production, when reducing easily fusible ores in the air or in blast bloomeries, or other formerly used types of low furnaces, in which the product sought to be obtained was malleable iron or steel.

This probability, indeed, appears to rest on conclusive grounds; and the tendency of this evidence is farther to show that the blast furnace, as an apparatus, having as a distinct object the production of cast iron, was at last arrived at through very gradual accretions to the height of the ancient types of low furnaces.

Where we are to look for the earliest traces of the practice of reducing iron to the form of a carburet, or as cast iron, I cannot at the present time venture to assert; but as the employment of steel in fashioning the stones used in the monuments of Proto-Egypt, India, Greece, etc., elsewhere has been shown, that fact alone seems to imply the acquaintance of those ancient nations with the fusion of iron, and leads us to expect that to the East, and not the West, we must look for the beginnings of this art.

In so far as Great Britain has yet given testimony, the oldest blast furnaces yet recorded are those of which the ruins formerly existed, and may, for aught I know, still exist, in the Forest of Dean, and the age of which Mr. Mushet has computed as belonging to the commencement of the seventeenth century.

It is desirable, in order to avoid the necessity of raising the question hereafter, once and for all to point out that it is not a consequence, because we are unable to assign an earlier positive date for the blast furnace than that above given, that cast iron was unknown before that period; indeed, from what we glean from the historical records, they assure us that it was in considerable use at a much more remote age. And whereas this knowledge might lead some persons to conclude that as the blast furnace constitutes the first step taken in the manufacture of cast iron to-day, it was necessarily the first step taken in ages long past; still, a consideration of certain features of history, coupled with a consideration of what chemistry now teaches, is more than sufficient to convince us that the high or blast furnace is not indispensable to the production of that carburet, however much it is essential, under our current knowledge, at this present period, in order to comply with modern demands for the metal at paying prices.

To indicate how much more ancient cast iron may really be than, so far as I have ascertained, has been noticed during the last quarter of a century, I may mention a process of making steel used by the Greeks, and recorded in the writings of no less an authority than Aristotle, to which I have on a previous occasion directed attention. Aristotle states: "Wrought iron itself may be cast so as to be made liquid and to harden again." Obsolete as the Aristotelian account of Greek steel-making is, nevertheless when the terms of the fragment are analyzed, and it is placed in juxtaposition with other accounts of steel-making appertaining to times long subsequent, it is sufficient to assure us that such iron (although it may not have been specially employed in the art of making castings, but was produced for the purpose of converting bars of wrought iron into steel, by a process of cementation in a bath of metal saturated with carbon) was known to the Greeks at least as early as 400 years before our era. Indeed, we may venture farther still—for recent discoveries in India, and the impossibility of explaining Egyptian sculpture in granite, porphyry, diorite, etc., without the use of steel tools, hold out hopes of increasing our acquaintance with the metallurgy of the ancient Eastern world, by special researches into the storehouses of information yet waiting there to be opened up. After the discovery of Kutub Minar Laht, near Delhi, as well as the huge iron beams in the temple of Kanare, and the coming to light of numerous other testimonies, proving beyond doubt the high acquaintance with manufacturing art which some persons, at least, possessed in the East in ages long past, the cautious observer is compelled to pause as pronouncing, as is generally asserted, that Western civilization has in all respects exceeded all previous civilization.

It is a question, whether we have attained, in some respects, the position in certain of the manufactures most important to man which was at one time reached by the workers of the ancient world; for while the rate of produc-

tion has increased as a necessary sequence of the growth of population, and of novel and wider fields of application, yet it is notorious that in too many instances high quality is not maintained.

There is much to be met with in the remains of the Proto-Egyptian, Assyrian, Greek and Chinese nations to show their superiority in this respect. And it is to Central Asia, Asia Minor and Persia that we must hopefully look for farther light on this subject.

While all the very old examples of iron which we do find are malleable, and from more than one point of view appear to have been produced from ores reduced without fusion; and when inquiring still farther into the most ancient practice of reduction, no country affords conclusive evidence of cast iron having been an established manufactured product—in the sense we find malleable iron to have been therein—yet the collateral evidence as to an extremely early method of making steel, in which the production of cast iron was a *sine qua non*, convinces us of the necessity for exercising extreme caution ere drawing a conclusion.

The next early intelligible account we have of steel making (after Aristotle) throws equal light upon cast iron making. This is to be found in a work entitled "Do la Pirotechnia," published at Venice in 1540, by Vanoccio Biringuccio; and in the somewhat later but better known writings of Agricola, "De re Metallica," published about 1561. Both these authors describe a process of converting bars of malleable iron into steel by keeping the bars immersed for a considerable time in molten cast iron.

The process, as described by the earlier author, has been translated by Mr. Panizzi,\* and I here quote an extract from that translation, showing how the cast iron was produced:

"Steel is nothing but iron well purified by means of air, and through much liquefaction by fire brought to a more perfect admixture and quality than it had before. By the attraction of some suitable substance in the things which are added to it, its natural aridity is mollified by somewhat of moisture, and it is made whiter and denser, so that it seems to be almost removed from its original nature; and at last, when its pores are well dilated and mollified with much air, and when the heat is driven out of them by the extreme coldness of the water, they contract, and so the iron is converted into a hard substance, which from its hardness becomes brittle. This may be done with several kinds of iron, and so steel may be made of all kinds of iron. It is true, indeed, that it is made better from one kind than from another, and with one sort of charcoal than another, and it is also made better according to the skill of the masters."

"The best iron to make it good is, however, that which, being by its nature free from the corruption of any other metal, is more easy to melt, which is to a certain extent harder than other kinds. With this iron is put some powder of iron, or other fusible stones, in order to melt together. By these it is purified, and they have, as it were, the power of taking away its ferruginousness, of constricting its porosity, and of making it dense and free from cleavage. Now, to conclude, when the masters wish to do this work, they take of that iron pressed through the furnace or otherwise, as much as they wish to convert into steel, and they break it into little bits; they then prepare before the operation of the furnace a circular receptacle, about a foot or more in diameter, made of one-third clay and two-thirds small coal well beaten together with a hammer, well mixed, and moistened with so much water as will make them keep together when they are put upon it, and so they fill it up and make a heap of charcoal over it."

"Then, when they see the whole mass is on fire and well kindled, especially the receptacle, the masters begin to set the bellows to work, and to put on some of that crushed iron mixed with salina marble and with pounded clay, and with other fusible and not earthy stone; and so melting this composition by little and little, they fill up the receptacle so far as they think fit; and having first formed with the hammer three or four little pieces of the same iron, each weighing 30 or 40 lbs., they put them hot into that bath of melted iron (which bath is called by the masters of the art 'the art of iron'), and they keep them there in the midst of this melted matter with a great fire about four or six hours, after turning them about with a rod as cooks do victuals, and so they keep them there, turning them again and again, in order that all that solid iron may receive through its porosity those subtle substances which are found to be within that melted iron, by virtue of which the gross substances which are in the lumps are consumed and diluted, etc., and the lumps become softer and more like a paste."

"When they are seen thus by the experienced masters, they judge that the subtle virtue of which we have spoken has thoroughly penetrated; and taking out one of the lumps which appears best from their experience, they test it, and bring it under the hammer, they beat it out, and then turning it suddenly as hot as they can into the water, they temper it, and being tempered they break it, and look to see if the whole of it is in every particle so changed in its nature as to have no small layer of iron within it; and finding that it has arrived at that point of perfection which they desire, they take out the lumps with a large pair of pincers, or by the ends left on them, and cut them up small pieces of seven or eight cast iron, and return them to the same bath to get hot again, adding to it some powdered marble and iron for melting to refresh the bath and increase it, and also to restore to it what the fire may have consumed; and also that which is to become steel may, by being immersed in that bath, be the better refined; and so at last, when they are well heated, they go and take them out piece by piece with a pair of pincers, and they carry them to the hammer to be beaten out, and make rods of them."

"When this is done, being very hot, and almost of a white color from the heat, they cast them all at once into a stream of water as cold as possibly can be had, of which a reservoir has been made, in order that the rods may be suddenly cooled, and by this means get the hardness which the common people call temper, and thus it is changed into a material which hardly resembles that which it was before it was tempered. For then it was only like a lump of lead or wax, and by tempering it, it is made so very hard as almost to surpass all other hard things; and it is also made very white, much more so than is the nature of its iron, even almost like silver, and that which has its grain white, and most minute and fixed, is of the best sort."

"Among those kinds which I know of, that of Flanders, and in Italy that of Valcamonica, in the territory of Brescia, are very much praised; and out of Christendom, that of Damascus, that of Caramenia and Lazzimino (?), as well as that of Agiambi (?)."

The same process is described by Agricola; but it is worthy of remark, as stated on the authority of the elder Mushet, that nowhere does he describe a process by which cast iron was obtained and applied to foundry purposes.

In India, near Trincomalee, steel (wrosts) is still made in the same manner, its manufacture being confined to a few families in that neighborhood, altogether unknown to the common steel makers of Salem, a distance of only 70 miles. The cast iron used in this case is obtained from a small blast furnace, about 8 feet high, and tapering from 18 inches diameter at the bottom to 9 inches at the top. The iron flows out of a gray quality, but without perfect separation, as the cinders produced contain a good deal of iron.

With regard, then, to the production of cast

iron in the most ancient low furnaces, it was practicable with ores easily fusible when in presence of large quantities of flux and a great excess of charcoal. The former would preserve the metal from oxidation, whilst it was allowed to remain a sufficient time in contact, to take up a maximum quantity of carbon from the latter. But, as the temperature in such furnaces was low, the slag of necessity contained a large proportion of the iron, and except with the most easily fusible ores, the process very slow; indeed, almost impossible.

With this certainty before us, however, of the possibility of producing cast iron even in the oldest known types of furnaces, coupled also with the well ascertained fact of the use of iron and steel by Greeks, Indians, Ancient Egyptians, and Assyrians, it is impossible to say how far back we may carry the date of the discovery of cast iron. But it is not, as I have already pointed out, to be inferred that the blast furnace has any claim at all to antiquity; on the contrary, I have collected together the foregoing evidence with the object, amongst others, of avoiding any misapprehension on that point.

M. Verill says that cast iron was known in Holland in the thirteenth century, and that stoves were made from it at Elsas in 1400 A. D. According to Lower, the first cannon of cast iron was manufactured at Buxteed, in Sussex, by Ralph Hogge, in 1543. It is recorded, however, by others that the first iron guns cast in England were made in London, in 1547, by Owen. In 1595 the art of iron casting was so well understood that John Johnson and his son Thomas had by that time "made 42 cast pieces of great ordnance of iron for the Earl of Cumberland, weighing 6000 pounds, or three tons, apiece."

Agricola, too, who died in 1494 A. D., seems to have been acquainted with cast iron, for he writes: "Iron melted from ironstone is easily fusible, and can be tapped off." So that, although he does not appear to say anything as to the method by which such cast iron was produced, it nevertheless is evident, when we consider the large extent to which cast iron was probably then employed for guns, and doubtless other purposes, that the blast furnace was at that time in existence, though on a very small scale.

It had probably grown out of the Catalan, and through the Blaesofen, or Osmund, to the German Stuckofen, in which cast or malleable iron was produced as required, by varying the proportions of the materials constituting the charge.

Percy says: Between the Luppenfener, or Catalan furnace, and the Stuckofen, German metallurgists place a furnace of intermediate height, which they designate Blaesofen and Bauernofen. This furnace was formerly employed in Norway, Sweden, and other parts of Europe; and though a century may have elapsed since it became extinct, for the first two countries mentioned, yet to this day it continues in operation in Finland. "Osmund" is the Swedish word for the bloom produced in this particular kind of furnace, outside of which consists of a timber casing, and the inner part a lining of refractory stone, the space between them being filled with earth.

The Osmund furnace is used for reducing the hydrated sesquioxide ores (lake or bog iron ores) found in the lakes and rivers of some parts of Northern Europe, and in Finland is stated at the present day to be working side by side with the modern blast furnace.

The Stuckofen would appear to be the last stage of transition from the low to the high furnace, into which it ultimately became merged altogether when the discovery was made that the ore was therein more completely reduced. The variety of purposes to which it was found the pig or sow metal could be applied, increased the demand for cast iron to such an extent as to induce the indirect method of reduction to be carried out on a large scale. It will therefore be unnecessary in this paper, which deals with cast iron and the blast furnace as its principal subjects, to refer farther to the pre-existing low furnaces.

Regarding the Stuckofen, then, or high bloomery furnace, it has been correctly described by writers on metallurgy as a Catalan or low furnace, extended upward in the form of either a circular or quadrangular shaft. In Germany this furnace is also known as Wulst, or the reduced metallic mass resulted from the operations being designated "Stuck" or "Wulst"—hence, the Stuck or Wulst—Salamanderfurnace—for the following particulars of which I am indebted to Professor Osborne's treatise, who, in a paragraph preceding the extract, significantly terms this "transition furnace," which might be used for the production of cast iron or malleable iron at will, by varying the constituents of the charge and the intensity of the blast. "Salamander" is the term now given to the mass of half pure iron which results when the molten mass of a furnace chills before it can be regularly tapped off into pigs. It is difficult to melt, and is sometimes largely malleable iron. The present may have originated from the earlier use of the word as applied to this furnace.

As the demand for cast iron increased, the Stuckofen was gradually replaced by the Blauefen (by some others termed the "blue furnace,"—Fr. "Fourneau bleu"), in which case iron alone was produced, but it still retained its place for the direct production of malleable iron. At first malleable iron was also produced in the Blauefen, which was then, it would appear, simply a tall Stuckofen, eventually, however, becoming increased in height to from 20 to 25 feet, in which case it was capable of producing cast iron only.

In working these furnaces for the production of malleable iron, the slag was allowed a constant escape, so that the lump of metal in the hearth might be exposed to the action of the blast, which prevented it from becoming carbonized to excess; at other times the slag was allowed to accumulate, thus protecting the metal from the decarbonizing action of the blast, after it had become carbonized in passing through the lower part of the furnace, and therefore producing carbonized or cast iron.

The Blauefen, as is common use on the Continent, may be kept in blast for three to six months, or even longer, after which the hearth widens, and interferes with successful operations.

In working with this furnace, the practice is to heat it by a fire, after which the blast previously open is closed; it is then filled to the top with coal and iron ore, which are renewed as the charge sinks. The tuyeres are about 14 in. above the hearth, which slopes toward the breast.

This furnace requires rich ores and a plentiful supply of charcoal; it produces good pig iron, as well as a metal specially suitable for steel, sometimes called steel-metal, and said to be that from which German steel (shear steel) is made. The management of the Blauefen is simple, and the furnace is cheaply constructed.

From the preceding remarks we have become familiar with the earliest known form of the blast furnace, which, originating in the Stuckofen, or high bloomery of some 95 cubic feet capacity, passed into the Blauefen of some 500 to 600 cubic feet. Without following its progressive development minutely through the furnaces in the Harz, Silesia, Prussia, Sweden, Great Britain, and America, we may come down to our own age, and now find furnaces in the Cleveland district of the enormous capacity of 30,000 to 35,000 cubic feet, or about 200 times that of an early Blauefen.

\* Percy's Metallurgy: Iron and Steel, p. 807.



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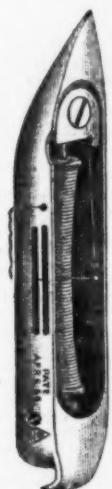
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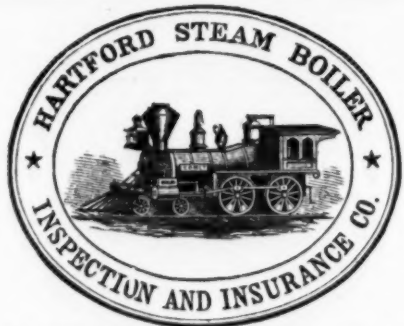
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**THE CHARLES GREGG**

MANUFACTURING CO.

BRASS WORK of all kinds,

FITTINGS FOR

**Steam, Gas and Water.**

PLAIN AND GALVANIZED

**WROUGHT IRON PIPE,**

Nos. 62 &amp; 64 Gold Street,

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Business Established, 1836. Incorporated, 1872.  
Send for Price List.**GRAFF TUBE WORKS.****WILLIAM GRAFF & CO.,**

Manufacturers of Plain and Galvanized

**Wrought Iron Pipe**

For

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Pipe of any Size, Length or Thickness furnished to order.

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Pumps, Water Closets, Fountains,

Vases, &amp;c.

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**Wilson Bohannon,**

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Railroad Switches,

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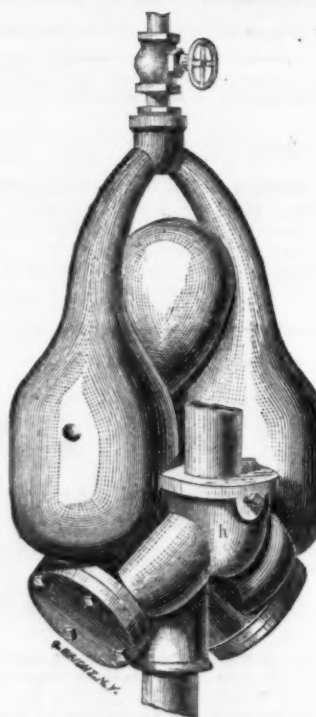
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Manufacturers of Patent Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Plan and Sewing Machine Locks.

141 to 145 Railroad Avenue, NEWARK N. J.

Illustrated Catalogues sent on application.

**THE PULSOMETER.**

The simplest, most durable and effective Steam Pump now in use. Will pump gritty or muddy water, without wear or injury to its parts. It cannot get out of order.

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**TURNED MACHINE SCREWS,**

One-sixteenth to five-eighths diameter.

Heads and points to sample.

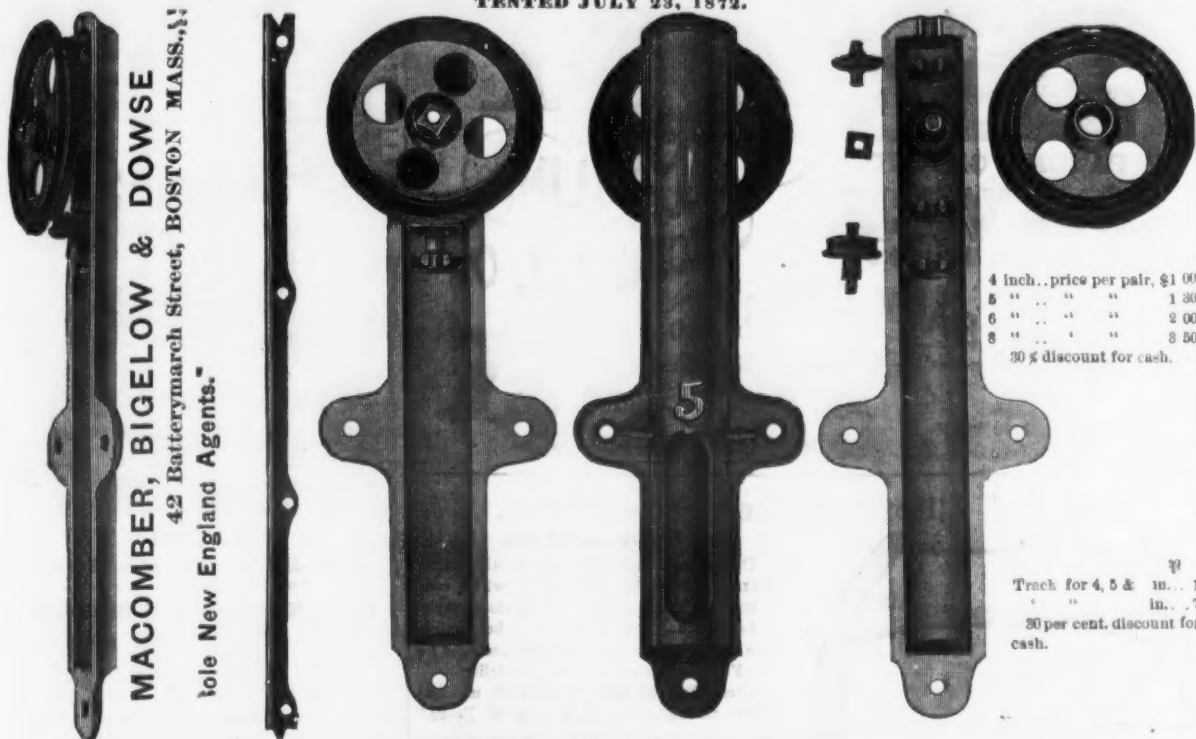
**IRON, STEEL and BRASS.****Lyon & Fellows Mfg. Co.,**

Cor. 1st and North 3d Streets, Williamsburgh, N. Y.



## PATENT NOVELTY HANGER,

PATENTED JULY 23, 1872.



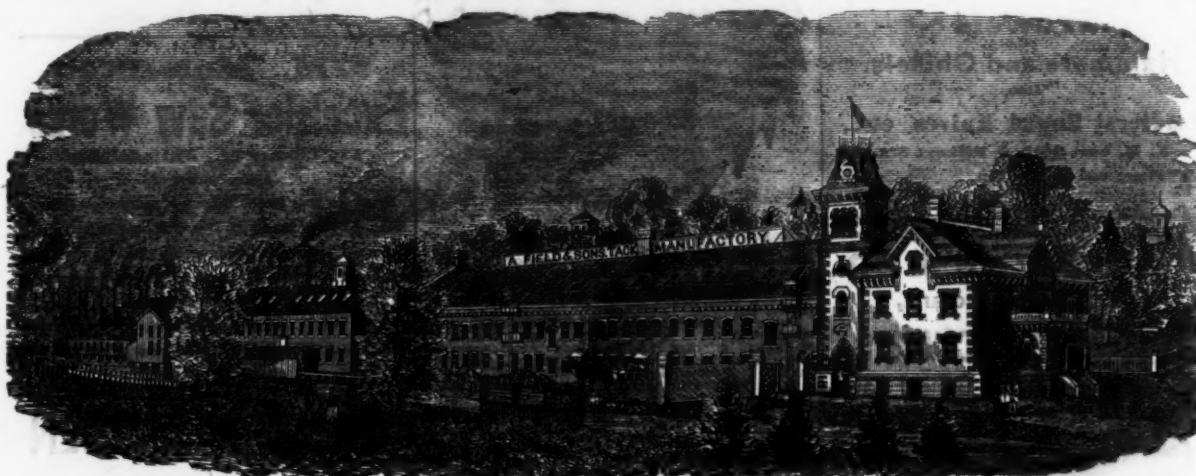
MACOMBER, BIGELOW &amp; DOWSE

42 Battery Street, BOSTON, MASS.,  
Sole New England Agents.

We, without hesitation, offer this Hanger as the best article in the market for the purpose. Its many advantages over all other Hangers are as follows:  
 1st.—It is more than double as strong as any other Hanger, owing to its semi-cylindrical or curved back.  
 2nd.—It is provided with a friction wheel at the top of the Case, which bears against the rear or outside of the sheaves, and prevents it from leaning outward and causing it to RUN TRUE, a feature not attained in any other Hanger.  
 3d.—By thus causing the sheave to run true, the doors are always held up Close to the Frame, and maintain a close joint around it.  
 4th.—The sheave has but one flange, there being a lower friction wheel provided with a flange which extends out under the face of the sheave and bears against the outer side of the track, which takes the place of the extra flange in the sheave, thus doing away with the grooved sheave which always grinds or breaks.  
 5th.—IT CAN NEVER RUN OFF THE TRACK.  
 6th.—It is the easiest running Hanger made, our 5 in. answering the same as 6 in. of the checkback and ordinary makes.  
 7th.—It is the Most Complete Hanger, in its construction, being tasty, as well as durable.

LOUDERBACK, GILBERT &amp; CO., 53 Chambers Street, New York City.

Also Agents for the CONNECTICUT CUTLERY CO., of Naugatuck, Conn., and keep on hand a complete assortment of their goods.



## A. FIELD &amp; SONS,

TAUNTON, MASS., Manufacturers of

## Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDEN IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

## American and Swedes Iron Shoe Nails,

Zinc and Steel Shoe Nails, Carpet, Brush and Cimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails

Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &amp;c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

# OTIS

## FURNACES & MINES.

### New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO.,  
Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & CO., New York.  
 Dear Sirs: The experience of a year proves that your Furnace Elevator is superior to all others in use. We have in the six weeks from December 1st to Sunday last, 19th inst., made 2794 tons, 1401 lbs. Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 79 feet high 45 tons Ore, Coke and Limestone for each ton of metal produced, or more than 11,500 tons material in the 6 weeks. The largest yield in one day was 311-4 tons Iron, involving the lifting of 345 tons material in 24 hours. This has all been done to our satisfaction, and that, too, in the coldest weather we have had. Other furnaces with water and pneumatic hoists have experienced great difficulty, on account of the water freezing in the tanks; and in the case of the air hoists, we understand that two furnaces, not far from us, had to "blow out," from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down. Very truly, yours,  
 DEWEY, VANCE & CO.

See for Circular to

OTIS BROTHERS &amp; CO.

348 Broadway, NEW YORK.

Over 60,000 Sold.

BAILEY'S PATENT

Adjustable Planes.

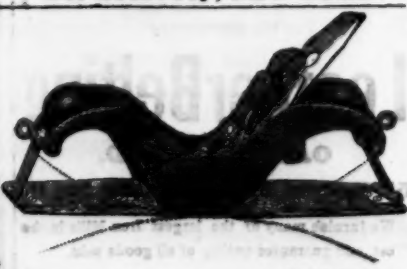
Manufactured by the

Stanley Rule &amp; Level Co.,

NEW BRITAIN, CONN.

Sold by all Hardware Dealers.

Warehouse, 55 Chambers St., New York.



# EAGLE IRON FOUNDRY.

## DEMAREST, JOYCE & CO.,

### Iron Founders,

### MACHINISTS,

and Manufacturers of

Sewing Machines,

Steam Fittings,

AND

LIGHT WORK of all kinds.

ALSO

Plain and Ornamental

Japanning.

20 to 30 Morton, and 57 to 65

Clymer Streets,

BROOKLYN, E. D., N. Y.

## OHIO TOOL CO.,

Manufacture

Planes, Moulds, Plane Irons, Bench Screws, Hand Screws, Hacksaws, Files, Chisels, Augers, Drills, Reamers, Taps, Dies, Vises, Vices, and all other tools and machinery.

Clark, Wilson &amp; Co., Agents, 81 Beekman St., N. Y.

## PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Dec. 22, 1873.

Comparatively quiet in wholesale trade, the week past has been a blessing to the retailers, as the approach of the holidays gives a general excuse for spending money otherwise hoarded. Whether it be that there is really more money in circulation than usual at this season, or that having it in hand people are tempted to spend more freely, there certainly never was gayer sights among our retail shops than at present, or more people busily engaged in exchanging their currency for useful or ornamental articles. The character of the importations advances in elegance each year, and the goods offered for the present year, while not more expensive, are certainly far more choice in appearance than at any previous holiday season. Confining ourselves to metallic productions, as in duty bound, it is noteworthy that a very large amount of the bronze ornamental goods sold as imported are made in this country and in this city, rivaling in elegance the finest foreign work. These are not confined to what is known as "spelter bronze," but ornaments, statuettes and figures of the real article, tinted and colored with the genuine foreign patina, which has hitherto been the obstacle to overcome in the manufacture of such goods. Considering the advances made by our works in the manufacture of gas fixtures, statuary bronzes, etc., this is not surprising, but it is an evidence of an improving and more highly cultured taste that such a trade should be supported and encouraged here. The benefits are, however, at once apparent. Ornamental bronzes, which last year could not be had under \$35 to \$50, now are offered in equal elegance, for from \$10 to \$15, thus enabling those of moderate means to possess articles of extreme elegance at a low figure. Another branch of our home industry, peculiarly American, but which has hitherto made little pretension to elegance, that of clocks, has made wonderful strides lately. Few of those who purchase the marble or bronze "Fine French Clocks," with silvery chime striking the quarter or half hour as well as the hour, and equal in accuracy of time to a regulator, know that they come from the busy manufacturing State of Connecticut. Such is the fact, and there are offered this year mantle and other clocks from Connecticut works, which, for beauty in casing and elegance of design, are not outdone by anything exhibited from abroad. Thus, while we note the increase of the great iron works and factories in our land, other industries, which add in a different but no less important manner to our wealth, comfort and enjoyment, are quietly springing up in our midst, although they may at first have, as many similar branches have been forced, to sell their goods as foreign to ensure a market.

While all this is pleasant to note, it is equally so to add that every day brings an increase of activity in general manufacturing. As a rule, the furnaces lately out of blast all over the country are either actually "blowing in," or preparing to do so. Many of the mills which intended to let the Christmas holiday continue indefinitely, or until spring, will not shut down over the week, and that will be occupied in repairs. The railroad companies have run old stock over shabby roads just as long as is possible, and 1874 will compel them to place orders for rails and rolling stock. Orders are to-day offering which, were prices satisfactory, could be placed to an amount sufficient to keep the works of Pennsylvania busy at least until May, and a similar state of things is reported West.

Some of our financial prophets draw the horoscope of the trade future as follows: "Money is easy because of lack of confidence to use it in business. Manufacturing is at a discount; by May, all the trades dependent on the railways will be absolutely idle; all the furnaces and rolling mills will be cold (!) The immense amount of capital invested in this business, released in common with that of other trades, will so force itself upon the market for employment as to compel a return of confidence in our ability and wealth, and business will then, but not before, revive." The man who wrote that must have his eyes shut, or a very false idea of the enterprise of our people. If every firm in the country had bankrupted in September, there would have been a lively trade in the effects of the defunct before Christmas. The gossip of the week is dull.

The Messrs. Cramp & Sons launched during the week the iron steam collier Reading, the first of six similar vessels for the Reading Railroad Co., for which this firm have the contract, but which form a portion of the fleet of one hundred which the company projects. There are already six of these iron vessels carrying coal to New York and New England ports. The six building at Cramp's will be the Hamburg, Columbia, Lancaster, Pottsville and Phoenixville, each of 1500 tons capacity, as is the Reading, just launched. At Roach's yard, at Chester, the Perkiomen and the Berks, of 1200 tons capacity each, are being built. In the spring the company's yard at Port Richmond will be finished, and their fleet will be rapidly increased. Most of these colliers in use have hitherto brought water ballast alone on return trips, but arrangements are being made to carry in the future a much more valuable freight, and one likely to have a considerable influence on the iron trade of Pennsylvania.

The question at issue between your Sheffield correspondent and Mr. Wilson for Rodgers & Sons, touching hand forged and "fired" razors, is outside of this ballcock. The hand forged razor may be the best, just as the iron which commands the highest price in the United States—Utah—is made, so far as welding the puddle ball is concerned, under a hammer; the latter refusing to allow a squeezer in his mill. But, as to the question of inferiority of American razors, or the consequent superiority of Sheffield goods, I can submit to Mr. Wilson, or any committee of Sheffield cutlery men, a specimen of American razor made in this city, within thirty days, of purely American steel, made from American iron, which I venture to state they will pronounce of superior quality to any ever made in Sheffield, and that is saying a good deal. The "proof of the pudding," &c., we all know, and one of these razors has been steadily used in the barber shop of a hotel for three weeks, without having been ever put on a hone, and with complete satisfaction to the shavers. Moreover, a tool made from this same steel turned off the entire face of a Krupp's steel tyre without being once sharp-

ened. This is not intended for a notice of anybody's steel, but simply to show our Sheffield brother that "all the worth in human nature is not concentrated on his side of the Atlantic," or the skill in steel manufacture, either! Samples of razors and other tools, as well as of the steel from which they were made, with satisfactory evidence of the production of both here in Philadelphia, are subject to the order of the publisher of *The Iron Age* at any time from date hereof. Sporting men have a phrase which runs vulgarly, "Put up or shut up," and Philadelphia here throws down the glove to Sheffield.

A matter of some interest to the members of the Franklin Institute was the report of the committee on opening the hall of Sundays, at the last monthly meeting. The committee reported in favor of submitting the whole matter to a vote of the members to be taken on the day of the annual election, which occurs on the third Wednesday in January. There can be but one answer to the question it would seem. The experiment has been fully tried here and elsewhere in the opening of free libraries on Sunday, and everywhere with the best results. The average workingman would at least be much better engaged in the reading room of the Franklin Institute on Sunday than in the holding communistic meetings at the Assembly Buildings and resolving, "that the city lease all mills and other industrial establishments that are idle, and the same would furnish employment to thousands." Here is a ring chance, which even the palmist days of your hapless Tweed did not offer. Fortunately we have just adopted a new constitution which upsets all rings and their stealings, and our international friends had better visit the Franklin Institute and study improved mechanics, by far.

We have just got to congratulating ourselves upon being able to build iron ships in competition with Great Britain, when, lo! they are to quite upset us by substituting copper as the material for shipbuilding. I take the following from a local paper and submit it *verbatim*. I should certainly be headed "Important if True," for if we are to use copper for ships, now is the time to get a ground floor position in the copper companies. Or, for the article is a little misty on this point, perhaps this is an American invention, and if so should be noted as another evidence of American enterprise. At all events, I give it as it appears, simply adding the Italian apothegm "*si non vero, e ben trovato*."

## A COPPER CLAD SHIP FOR CARRYING COMBUSTIBLE FREIGHT.

The importation of corrosive sublimate, vitriol and similar dangerous compounds has heretofore been carried on to a small extent, says the *Jersey City Journal*, owing to the damages ensuing to the ships used in their transportation, as the leakage and draining from the different named substances, when mixed in the bilge water of the vessels, has in most instances eaten the bottoms out of the vessels.

A company in England running to the East Indies first thought of using copper in the construction of their vessels as a preventive against the bugs that infest that locality, the said bugs being considered death to all wooden vessels, and instances have been known of the successful depredations of the insects even on iron-clad ships. To obviate these drawbacks to commerce a ship was built completely encased in copper.

The frame work is of iron, which, however, is not exposed in the least. The outside is covered with sheets of thick copper, riveted in the same manner as the iron vessels. The whole interior of the ship is also made of copper, the inside copper being galvanized, the beams and, in fact, every exposed part being completely protected by copper, the masts are of wood, but sheathed in copper from top to stem. The name of this copper monster is the *Adirondack*; she is a screw steamer, and is capable of carrying 7000 tons custom house measurement, and is about 515 feet in length, being some seventy feet longer than any of the Oceanic Company's ships.

The White Star line have purchased this steamship for the purpose of carrying such freight as mentioned. Her upper deck has been fitted up with a large tank for carrying oil of vitriol in bulk, lunar caustic, potash, sal soda, and in fact all similar kinds of freight will be imported in larger quantities now, should the trial trip succeed, which there is every prospect of its doing. The *Adirondack* is now being got ready for her trip, and will arrive in this port in the course of a fortnight. She is coated on her outside with a preparation of fat and copal varnish, to protect her from the effects of the sea water, and it is said that the reflection of the ship upon the ocean on a bright sunny day is like the reflection of the sun at sunset on a large building containing many windows, only on a larger scale. It is claimed that she can be seen at sea on such days, a distance of about seventeen miles.

## THE COAL TRADE.

The following summary of coal figures gives the statistics of the trade for the year very fully, and as the close is so near will be valuable to those interested on this subject: Of the total number of 5,318,897 tons of coal delivered on the line of the Reading Railroad and branches during the year ending on the 30th of November last, there were received at Harrisburg and other points 629,267 tons of anthracite coal, and also 310,267 tons of bituminous at Harrisburg. Of the anthracite 203,659 tons were shipped from Port Richmond, and 25,965 tons were consumed by the company, leaving for the consumption of the line and Philadelphia, 399,643 tons. Of the 310,267 tons of bituminous coal received at Harrisburg, 16,453 tons were shipped from Port Richmond, and 13,077 tons were consumed by the company, leaving 230,727 tons for the consumptions of the line and city trade. This would give the consumption of coal on the line and city trade derived from other regions at 630,370 tons. The whole quantity of coal delivered by rail for the line and city trade was 2,745,444 tons, independent of 356,138 tons consumed by the company in transportation, &c.

The total tonnage of coal shipped via the Schuylkill Canal during the year ending on the 30th ult. was 743,796 tons, of which 117,016 tons were delivered on the line west of Philadelphia, 54,550 tons were sent south of Philadelphia, and 369,128 tons east of Philadelphia. The coal traffic of the Pennsylvania and New York Railroad for the year ending Nov. 30 was as follows in 1873, compared with 1872:

	1873.	1872.
Anthracite.....	629,267	590,988
Bituminous.....	310,267	337,192
	939,534	928,180

Increase in 1873, 69,112 tons.

In the anthracite regions of Pennsylvania, in 1872, there were 222 persons killed, 611 injured; there were 98 shafts, 224 slopes, and 75 drifts and tunnels at work, employing 70,000 men, and the amount sent to market was 18,929,263 tons.

The *Mauch Chunk Gazette* of yesterday contained the following figures:

Up to the close of last week there had been transported south from here, over both the railroads, since the first of January, 5,638,774-19 tons.

Last week the shipments from here amounted to 78,133-13 tons, being 30,109-01 tons more than the preceding week.

The corresponding week last year 80,771-17 tons were sent south from here, and the total for last year to this time was 5,122,613-16.



**HENRY DISSTON & SONS'**  
**SAW, TOOL,**  
**STEEL AND FILE WORKS,**  
 Front and Laurel Streets,  
 PHILADELPHIA, PA.

**H. W. PEACE,**  
 MANUFACTURER OF  
**SAWS OF ALL KINDS.**  
 FACTORY, WILLIAMSBURG, N. Y.

**AMERICAN SAW CO.,**  
 No. 1 FERRY STREET, NEW YORK.



Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This is especially the case with cross cuts having Patent Teeth. In the perforated saws all gumming is avoided and the teeth are easily kept long and in proper shape, saving time, labor, expense and vexation. As is well known, our saws cut faster, smoother and easier than any other.

**MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.**

**J. FLINT & CO.**  
 Manufacturers of all kinds of **SAWS AND PLASTERING TROWELS.**  
 ROCHESTER, N. Y.

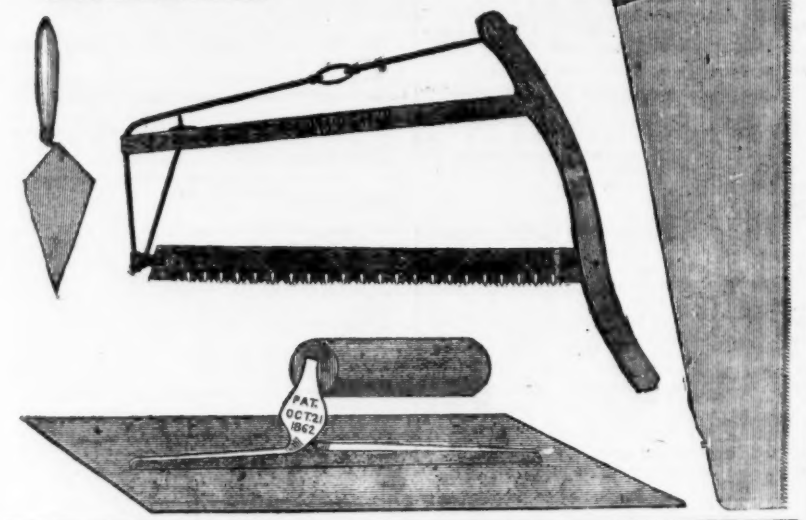
**Dietrich's Patent Wood Saw.** Guaranteed the strongest, lightest, easiest to strain or tighten and best braced wood saw made; also to give perfect satisfaction.

**Dietrich's Patent Double Handle Rip Saw.** All will readily see the benefit of this useful invention.

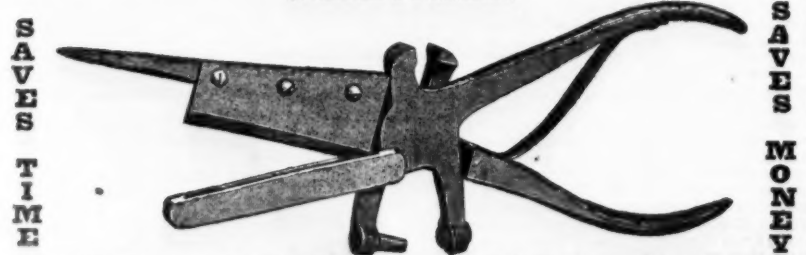
**J. Flint's Patent Plastering Trowels.** The best made and finished trowels in the world. We make four grades of Plastering Trowels, from the best to the cheapest.

Our patent method of grinding hand saws makes them superior to any in the market.

Send for Illustrated Price List.



**AMERICAN BELT TOOL,**  
 (FOSTER'S PATENT.)



We would call your attention to this little Tool, which we consider an indispensable article in any well-arranged establishment using Belting. It is a combination of Punch, Cutter, Awl, and Nipper, combining in one tool all that is necessary to put together Belting with lacing or hooks. Costing less than the same Tools bought separately.

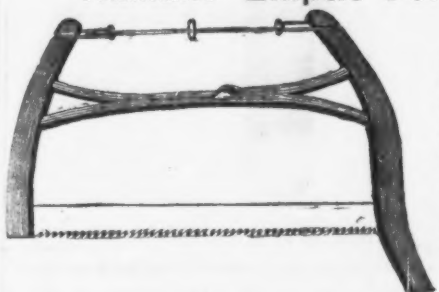
SOLD AT MANUFACTURERS PRICES BY  
 Minot & Co., Boston; Henry Hopkins, 96 Chambers St., New York;  
 J. L. Wayne & Son, Chicago.

**LOWELL WRENCH CO., Worcester, Mass., Manufacturers.**  
 CHARLES CHURCHILL & CO., European Agents, 22 Wilson St., Glasgow, London, E. C.



**Hankins' Elliptic Forked Saw Frame.**

Patented June 28th, 1870.



This is a new engraving representing HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any centre bolt, secures for the Frame great strength and durability.

These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

**HARVEY W. PEACE**  
 VULCAN SAW WORKS,  
 WILLIAMSBURG, N. Y.

**W. ROSE & BROTHERS**  
 WEST PHILADELPHIA,  
 Manufacturers of

**Plasterers' and Brick Trowels**

Hammers and Chisels.

ALSO,

Saddlers' Round Knives etc.,  
 N. E. cor. 36th & Filbert Sts.  
 Please send for Price List.

**E. C. ATKINS & CO.,**  
 Indianapolis, Indiana,  
**Saw Manufacturers.**

Best Cast Steel Patent Ground Saws,  
 Also, sole Manufacturers of Atkins' Patent



**CROSS-CUT SAW HANDLE.**

Best Patent Handle in use.  
 Manufacture and Office—Nos. 210, 212, 214 and  
 216 South Illinois Street.



I make a specialty of the LARGEST SIZES of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence: Evenness of Temper.—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed BALANCES PERFECTLY, which is a proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention to this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to direct equal strain in all its parts, and at the same time RUN TRUE. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

**JAMES OHLEN.**



Price: Japanned No. 6, \$5; Coppered No. 6, \$6; Silvered No. 6, \$8.

Liberal discount to the trade. All springs warranted to be of the best Steel Wire.

Depots: HYATT & SPENCER, 54 Beekman St., N. Y. SIDNEY SHEPARD CO., 68 Main St., Buffalo, N. Y. PALMER & GRAY, 225 Elm St., Cincinnati, Ohio. Factory, Indianapolis, Ind.

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39 West 4th St., New York.

IMPORTER OF  
**Wood Screws, Steel in Sheets,**  
**BAND SAWS, TOOLS FOR BRAZING, &c.**  
 Bed Screws, Pin Hinges, and Wire Nails a Specialty.

**NEW YORK SCREW BOLT WORKS.**

(Estate of R. J. DEWHURST, deceased.)

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 Office and Works, cor. Ave. D and 11th St., N. Y.

**Bolts, Nuts, Turnbuckles, Washers, Forgings, &c**

The attention of large firms solicited.

**Alexander Brothers,**  
 Manufacturers of **OAK TANNED**

**Leather Belting**  
 412 North 3d, Philadelphia, Pa.

**WM. H. STOYLE.**

MANUFACTURER OF

**Machine Cut Belt Lacing,**

No. 403 Library Street,

**BRADFORD & SHARP,**

Manufacturers of

**Leather Belting**

**OAK TANNED,**

57 Walnut Street, Cincinnati, O.

We furnish many of the largest Iron Mills in the West, and guarantee quality of all goods sold.

Send for prices.



**BOYNTON'S LIGHTNING SAWS.**

Awarded the Medal of the American Institute, 1872.



Two Direct Cutting Edges, instead of one Scraping Point. Note extra steel and durability over the old V, outlined on M tooth.

A Challenge of \$500, toward expense of a public test, to prove that the Lightning Saws excel all others in Speed, Ease, and Simplicity, has been offered since 1870, and has never been accepted. More than 100,000 Lightning Saws were sold during the year 1872, the purchasers of which testify to their superior merits.

Our leading papers, such as the Tribune, American Agriculturist, Christian Union, etc., have published over sixty editorial notices recommending these Saws. Farmers' Clubs, Lumbermen, and Hardware Dealers unite in pronouncing the genuine Lightning Saw the greatest labor-saving implement of the age.

I have hundreds of letters from practical sawyers, voluntarily written, expressing their entire approval of these Saws.

Where the Hardware Trade do not sell the Lightning Saw, I will send a 6-foot cross-cut and a buck saw-blade on receipt of \$5.

For Catalogue and additional information, address

**E. M. BOYNTON, 80 Beekman St., New York,**

Sole Proprietor and Manufacturer.

**WM. McNIECH,**  
**Excelsior Saw Works.**

515 Cherry St., Philadelphia.

Manufacturer of

Extra Cast Steel Saws of every description,  
 Pat. Screw Socket Pole Pruning Saws,  
 Patent Screw Socket Edging Knives,  
 Patent Screw Socket Scuffle Hoes, and  
 Patent Screw Socket Paper Hangers' Scrapers,  
 Mowing Machine Sections of all patterns constantly on hand.

**WHEELER, MADDEN & CLEMSON,**  
 Manufacturers of Warranted Cast Steel

**SAWS**

of every description,  
 including

Circular, Shingle, Cross Cut,  
 Mill, Hand, Roberts' and  
 other Wood Saws,  
 &c., &c

**Cast Steel Files**

of the well known brand of

**Wheeler, Madden & Clemson.**

FACTORIES:

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BRANCH OFFICE:

97 Chambers Street, New York.

**BRUNDAGE FORGED HORSE NAILS,**

Manufactured from

**BEST NORWAY IRON,**

by **BRUNDAGE & CO.** Sold by

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## Cutlery.

# Landers, Frary & Clark,

New Britain, Conn.,  
MANUFACTURERS OF  
**TABLE CUTLERY**  
OF EVERY DESCRIPTION. ALSO.

## General Hardware,

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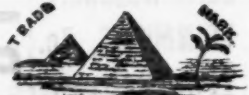
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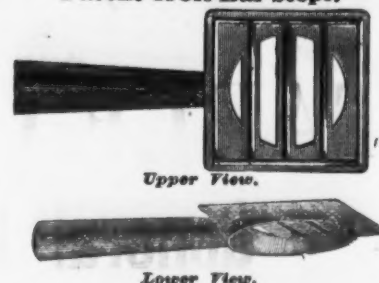
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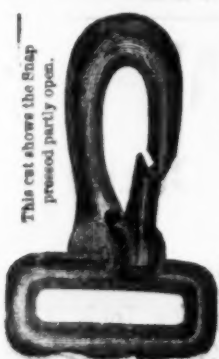
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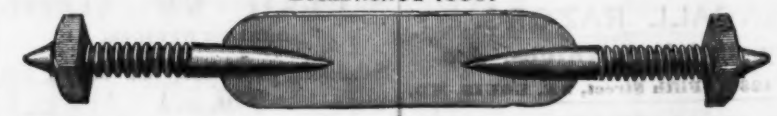
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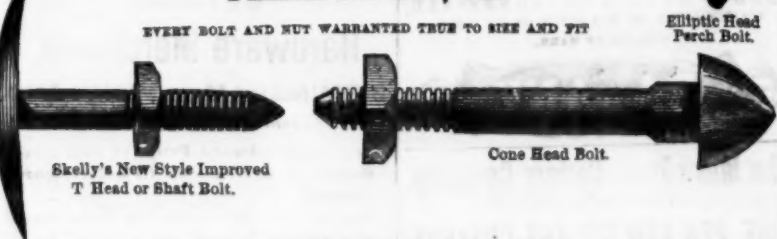
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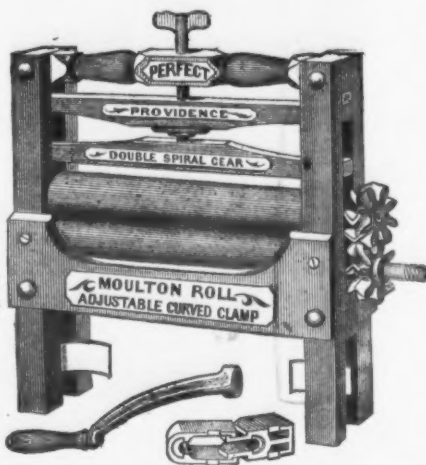


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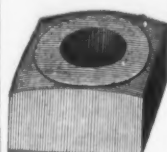
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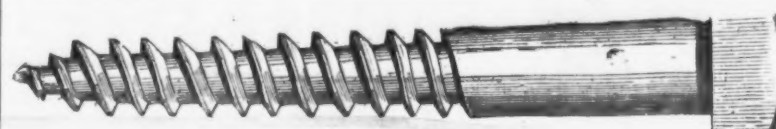
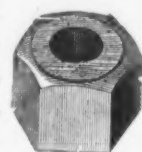
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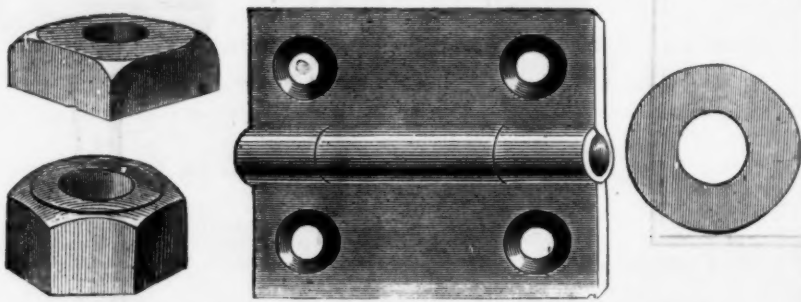
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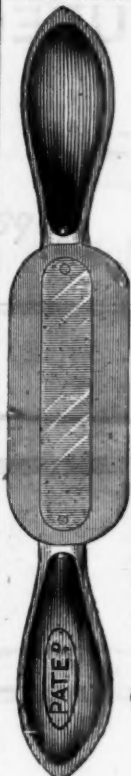
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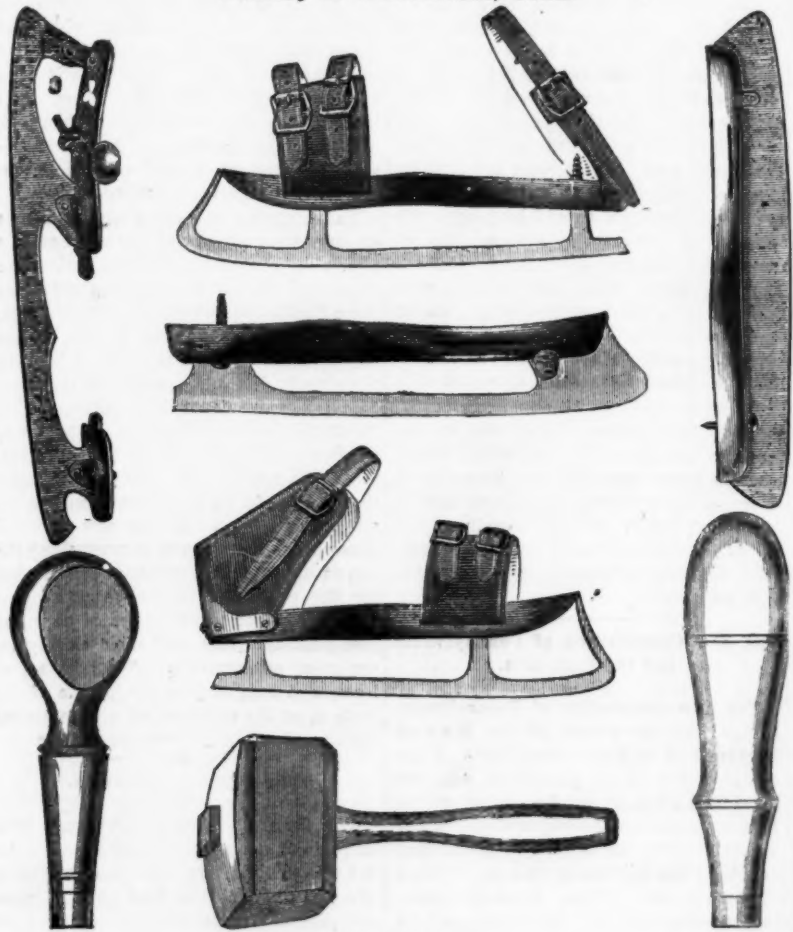
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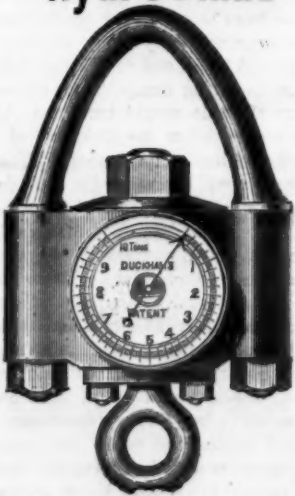


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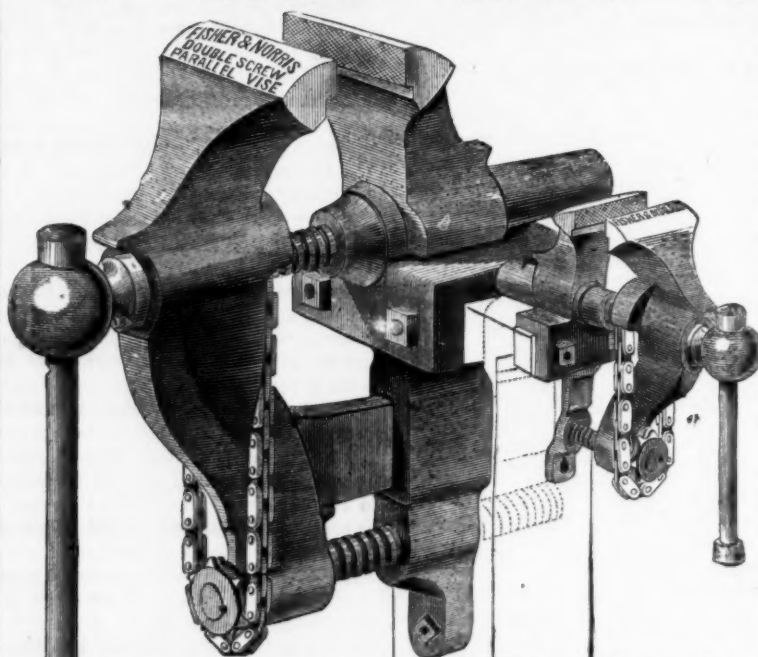
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# The Iron Age.

New York, Thursday, December 25, 1873.

DAVID WILLIAMS . . . Publisher and Proprietor.  
JAMES C. BAYLES . . . Editor.  
JOHN S. KING . . . Business Manager.

The Iron Age is published every Thursday morning, at No. 10 Warren Street, New York, on the following terms:

## SUBSCRIPTION.

**Weekly Edition** . . . . . \$4 a year.  
Issued every THURSDAY Morning. Contains full Trade Reports for the week, brought up to the close of business on the previous day.

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## The Lessons of a Year.

The events of the year now drawing to a close, especially those which will make it memorable in our commercial history, have taught us many practical lessons which it would be well for us to remember. The system of philosophy which teaches that our misfortunes are blessings, in that they show us how we may avoid worse evils and misfortunes in the future, may not find universal acceptance, but it is based upon a truth which admits of universal application; and if our national misfortunes during the past year do not result in permanent national benefit, it will be because we shall refuse to heed the lessons of prudence and foresight which they should convey to every thoughtful mind.

Among these lessons the most obvious is that which points out the danger of trusting to the promise of an uncertain future, as seen from the standpoint of a prosperity resulting from unduly stimulated and speculative commercial activity. The panic came upon us without warning or premonition. A few far-sighted persons may have apprehended a sudden collapse of the bubble of railroad speculation, but it was, at most, only a vague apprehension, and none knew when it would come, nor how disastrous would be its effects. When the crash came which shook our financial and commercial systems to the foundation, we were unprepared for it, but, fortunately, in a position to bear up against it. We had learned from experience the danger of long credits and extensive commercial operations upon small capital, and our merchants and tradesmen were doing business upon so safe and solid a basis that the danger of a credit panic was averted. Had we also learned from past experience the folly of building railroads upon call loans, of expanding our railroad system beyond the requirements of commerce, and of attempting to force, by artificial means, a national development more rapid than our increase in population

and wealth would permit, we should have escaped the misfortunes which have befallen us, our workshops and factories would not have been closed, our working people would not have wanted employment, and our commerce would not have suffered partial paralysis. It would be profitless, even at this time, to recount these facts, were it not that the causes which brought about the panic are mistakes to be guarded against in future, and if the lesson learned from experience is remembered, we shall in future enjoy a more substantial and regularly developed material prosperity, even though our progress in certain conspicuous directions be less rapid. Capital has been taught the danger of seeking investment upon the specious representations of interested speculators, and of discounting too cheaply the promise of an uncertain future; and unless the spirit of reckless speculation shall again take possession of the people, this lesson, at least, is likely to be remembered.

A second important lesson of the year is the warning it carries of the danger of considering our industries beyond the reach of foreign competition, because, from various causes, they may chance to enjoy a more than average prosperity. During the first half of the year the opponents of the tariff found in the admitted prosperity of certain industries, especially in iron manufacture, a pretext for raising the cry of "favored monopolies," and for demanding that these industries, then competing upon more than equal terms with those of foreign nations, be cut off from all the benefits of security they had enjoyed under protection. Even among iron makers' there was some disposition to regard the benefit of the tariff, so far as they were concerned, as a thing of the past, and to both feel and express indifference to the future action of Congress upon this all important subject: while at this very time foreign manufacturers were sending to this country, under the comparatively low duty imposed by Congress, large shipments of iron, much of which was sold at a loss, and much left unsold, to be sacrificed, as soon as any demand exists, at prices with which our own makers' cannot compete. Let us not be understood as expressing views different from those expressed by us early in the year. We have lost none of the confidence we then expressed in the future of American iron, nor do we doubt the entire wisdom of the most liberal investments in iron manufacture, if made judiciously and with reference to future, as well as present, advantage. We believe, moreover, that this country will be the future seat of the great iron industries of the world, for reasons so obvious that even our British competitors are compelled to admit that the world's supply of iron, ores and coals must be sought on this side of the Atlantic at no distant day. We believe that England has reached the limit of her greatest possible industrial expansion, that she has lost, or is losing, the ability to maintain her export trade to this and other manufacturing countries, and that we are steadily gaining strength as a competitor for her export trade in iron: but as we have said all along, we must not consider her a broken and powerless rival until we shall have captured her trade, or we shall but furnish her with a new industrial vitality born of strength we ourselves shall lose.

In our progress toward a great industrial development, we must expect to pass through many seasons of dullness and depression, perhaps of disaster. It will not be all smooth sailing, and one of the most important lessons to be drawn from our experiences in 1873 is, that we are not yet ready to sacrifice any part of the system of protection to home industry, to satisfy the clamor of those who would have the extent to which we export gold to pay for foreign commodities the measure of our national prosperity. The time will come when we shall not need a tariff for protection, but that time has not yet come, and 1873 has given proof that it is yet a long way off.

There is but one other lesson of the dying year to which we have space to call attention at this time, and of this we must speak briefly. It is the inutility of trade unions, and the folly of all attempts on the part of labor to control capital. We are no advocates of cheap labor. High wages have contributed materially to the growth of the country by attracting to our shores the skilled and unskilled labor of Europe, and without that inducement immigration would fall off rapidly. But under ordinary conditions of industrial and commercial activity, wages must remain relatively higher in this country than in Europe, for the reason that the demand for labor must exceed the supply for generations to come. Nor are we opposed to industrial organizations on general principles. They are capable of accomplishing much good, and should be encouraged by capital in any beneficial and praiseworthy under-

taking; but when the trade unions imbibe the spirit of communism, when they give eager audience to demagogues who preach the so-called socialistic errors which the history of centuries has disproved; when they "make war upon capital," and by strikes and violent measures seek to coerce it into submission to the ignorant will of labor, such unions become public nuisances, if nothing more. During seasons of great industrial activity they gain a seeming power. Capital yields to all reasonable demands, and sometimes to demands that are unreasonable, and the demagogues flatter their deluded followers into the belief that the power of capital is broken, and the day of triumph for labor is at hand. But with the first menace of real danger to the interests of capital the scene changes. Concessions are withdrawn; workshops and factories are closed until their owners shall please to open them; wages decline to employers' terms; men who, a few weeks before, threatened strikes and talked loudly of the power of the unions, beg for employment upon any terms rather than stand idle and starve, and the demagogues are silent. Such a change we have witnessed during the year now drawing to a close. What is the lesson of that experience? It is that labor cannot control capital, and that in employing strikes and threats as a means to that end, the trade unions only furnish the world an illustration of "the engineer hoist with his own petard." But another and most important truth has been taught by the events of the past three months, and that is that capital has at heart only the best interests of labor. In hundreds of cases workshops and factories have been kept running on part time, for the sake of the workmen and their families, when their owners would have saved money by closing them; in many instances which have come to our knowledge money to pay wages has been borrowed at ruinously usurious rates that the men might have something to live upon; and in nearly every instance of which we have any knowledge, employers have considered the best interests of their operatives, and have made every sacrifice of self-interest which could redound to the advantage of those dependent upon them. Will the workmen profit by this experience, or will they forget the lesson they have learned, and re-enact, with the return of prosperity in 1874, the follies and crimes of which the trade unions have been guilty during the past few years?

## Congress.

It is, perhaps, scarcely worth while to waste valuable space in complaining of the shortcomings of Congress. Experience has shown that the average member of that body cares about as much for public opinion, outside of his own district, as a graven image cares for the opinion of an art critic who may chance to hold it in low esteem; and if he can "make things right" with his constituents by doing good party work and occasionally introducing a bill to further some "job" in which the electors of his State take an interest, he feels that he has done his whole duty as a member of the National Legislature. That he is in any way accountable for the utter neglect of measures designed to promote the general welfare; that he is responsible, so far as his influence goes, for the sins of omission, as well as of commission, with which Congress is justly chargeable—in a word, that he has anything to do beyond serving his party and making his own re-election to office sure—are ideas so large as to be practically beyond his intellectual grasp. The country might be tottering on the verge of war—he would postpone action until the possibilities of irrelevant discussion were exhausted: the national treasury might be threatened with bankruptcy—he would think time properly employed in wrangling over the amount which he could safely vote himself in the form of increased salary: domestic peace might be threatened—he would take advantage of the time which should be given to precious business, to blackguard his political opponents, and to vote for an adjournment on the slightest excuse, that he may rest from the cares of office which bear so heavily upon him. If someone rises to speak who has more reputation for wisdom and earnestness of purpose than for wit, and who is not likely to make any fun for the House or Senate by engaging in undignified and improper personalities, he retires to the cloak room, or to the bar, or takes advantage of the opportunity to write letters to his constituents; and when it comes to voting, he does as he is bid or as his selfish interests prompt. We may condemn his course, we may denounce him as false to his solemn promises and unworthy of the high and responsible trusts committed to his care, but he is either re-elected or retired to make room for another time-serving politician, and so it goes. Such is our estimate of the average member of Congress: we hope we do his merits justice,

however imperfect may be our conception of the positive and negative defects of his character as a "statesman."

We are moved to express our opinion thus freely, not by any hope that what we may have to say upon the subject will result in any more of benefit than usually comes from scolding, but because of the utterly inexcusable—we might say, outrageous—manner in which Congress has trifled since the opening of the session with questions of immediate and serious interest to the business community. During the recent panic the one consoling thought was that Congress, now that the defects of our financial system and the inadequacy of our currency supply had been made so unmistakably apparent, would promptly pass some measure designed to afford present relief, and to guard against monetary stringency in the future—at least, in the immediate future. The merchants and manufacturers did not ask for relief without knowing what they wanted or how they were to get it. Their demands were clearly expressed; they wanted free banking, more currency and the repeal of an unjust bankruptcy law which, honest enough it its original purpose, had been made a means of oppressing unfortunate debtors, and of defeating the wishes and imperiling the interests of creditors in general. So strong was the tone of public sentiment on these questions, that it was confidently believed Congress would at least take them into serious and intelligent consideration. But no, it has had no time for this. Our honorable representatives at Washington have been too busy calling each other bad names, wrangling over the best means of hushing up the salary increase scandal and squabbling over matters of infinitely small importance, to give any heed to the petitions of the manufacturers and the merchants for relief from the evils which have overtaken commerce. And now our exhausted statesmen have adjourned for the holidays, leaving commerce, manufactures and agriculture to wait for relief until the more urgent demands of pleasure making have been attended to. Not only has nothing been done, but, from present appearances, it is safe to conclude that nothing is going to be done when our honorable representatives shall return refreshed to their labors.

"Whom the gods wish to destroy they first make mad." If it were not that we have an abiding faith in the permanence of our institutions, we should look upon this madness of Congress as a premonition of impending national destruction. But the time is coming when the patience of a long suffering and more than good natured people will have been exhausted, when an outraged public sentiment will make havoc with the schemes of the mere politicians, and when the now hopelessly small minority in Congress of men who are not blind to the grave responsibilities which devolve upon them, and who have time to devote to the consideration of measures designed to promote the public welfare, will be powerfully reinforced by worthy men, who, whatever their party, will be afraid to trifle with duty.

## The New Constitution of Pennsylvania and the Railroads.

The new constitution of Pennsylvania, adopted by the people of that State on Tuesday last, is a document which, if not circumvented by the politicians, will lead to radical changes in the policy of the Legislature toward the corporations owning and controlling the various routes of land and water transportation built or projected within the State limits. Generally speaking, these changes will be in the direction of reform, since the liberty of the Legislature to grant special favors to powerful corporations will be restricted by the fundamental law, to alter or amend which will be a task beyond the power of the venal officeholders, so long as the people desire good government and freedom from the oppressive rule of great and wealthy monopolies.

As we have already given in these columns the text of such portions of the new constitution as relate to railways and canals, it is only necessary at this time to speak in general terms of its provisions. Primarily, it declares all routes of transportation public highways, open to all forwarders upon equal terms. This is an unmistakable declaration of the right of eminent domain, which leaves the corporations no chance to plead exemption from legislative regulation, because of the sacredness and inviolability of vested rights. It affirms what should never have been open to question, that one legislative body cannot place an insurmountable obstacle in the way of carrying out the will of the people as expressed by the action of a subsequent legislature; and that by no enactment subject to amendment or repeal, as all legislative enactments are, can the right of eminent domain be signed away from the people of the commonwealth.

Any individual or corporation may build and operate a railroad within the limits of the State, on condition of paying for private property appropriated or damaged; any railroad may intersect any other railroad, and have the privilege of using its track, and there shall be no discriminations nor unnecessary delays in forwarding passengers and freights upon any railroad on which they must pass to reach their destination. This clause will prevent those disgraceful quarrels which often arise between railroad managers, and which, in this and other States, have so often interrupted travel and transportation. Companies engaged in transportation, and the lessees, managers or purchasers of their property, are prohibited from owning, controlling or leasing competing lines, and the question whether lines which it is proposed to lease are competing or not is to be decided by a jury in the course of common law. All railroads and canals are declared forever subject to taxation, and the power of the State to tax them cannot be surrendered or suspended by any contract, charter, grant or concession to which the State shall be a party. Perhaps the most important section, however, is that which prohibits incorporated companies doing business as common carriers from engaging, either directly or indirectly, in mining or manufacturing articles for transportation, and from acquiring any lands except such as may be necessary to the successful carrying on of their business as common carriers. It is to be regretted that this clause was not made a part of the constitution of the State twenty years ago, as it would have prevented the railroads from carrying out their policy of acquiring a practical monopoly of the coal trade. Late reforms are better than none at all, however, and it is gratifying to know that coal lands not already owned by the carrying companies will hereafter be safe from their clutches, unless the legislature shall succeed in evading the intent of the constitution in laws enacted to encourage and protect monopoly. The only exception to this provision is made in the case of mining and manufacturing companies, which are permitted to carry their products to market over their own lines of transportation, for a distance not exceeding fifty miles. The legislature is required to enforce their provisions by the enactment of general laws—all special enactments and concessions being unconditionally prohibited.

The adoption of such a constitution is an interesting experiment, at least, and its effects in remedying existing evils and abuses, of purifying the atmosphere of the State Capital, of preventing the use of improper influences to secure special legislative favors and franchises, and of limiting the already dangerous powers of the great carrying companies, will be watched with solicitude, if not anxiety, by the people of the State. The great State of Pennsylvania needs a better and purer government than it has had for many years, and we incline to the belief that the new constitution will be instrumental in compelling the legislature to make the reforms most needed for the protection of the people's rights against the combined power of unprincipled political traders and their employers, the great corporations. We hope so, at least, and congratulate the people of the State upon the adoption of a constitution which makes such reforms imperative.

## The Business Situation.

The favorable news which comes from all parts of the country encourages the belief that the recovery from the paralyzing effect of the panic has been quite as rapid and general as could be expected under the circumstances. November and December are bad months for recovery from any depressing influence which has blighted the promise of a good fall trade, and especially from a panic so severe and so complicated as that through which the country has just passed. They are usually months of dullness and uncertainty, and rarely witness much of either industrial or commercial activity. Recovery from the effects of the panic has, therefore, been slower than it would have been at any other season, and the business community have generally looked forward to the end of the year with impatience, believing that with the advent of January the tide would turn and the course of trade tend in the direction of a steady and sustained improvement. That this expectation will be realized in some degree, if not wholly, is probable from the fact that, notwithstanding the unfavorable circumstances noted, a marked improvement has already taken place. There has not yet been a general resumption of the usual commercial and industrial activities, but trade is everywhere reported improving, merchants are meeting their obligations promptly, considerable extended paper has been taken up by large houses temporarily embarrassed during the panic, and many factories have resumed operations that were not expected to resume before spring.







# Trade Report.

Office of THE IRON AGE.  
TUESDAY EVENING, Dec. 23, 1873.

The close of a comparatively uneventful week finds Wall street quiet throughout, the near approach of the holidays tending, as usual, to restrict speculative operations and limit business of all kinds. The money market continues easy, the rates on call loans being 6 @ 7 per cent. to brokers. Mercantile paper is in but little request, and is quotable at 9 @ 12 per cent. for "gilt edged." The gold market has continued dull and inactive, and the tendency of the premium has been steadily downward. The rates for carrying gold to-day were from 7, gold premium, to 1.32 of one per cent. per day. Foreign exchange is weak at 108 1/2 for 60 days, and 109 1/2 for demand. The following shows the daily range of the premium:

	Highest.	Lowest.
Thursday.....	111 1/2	111 1/2
Friday.....	111 1/2	111 1/2
Saturday.....	110 1/2	110 1/2
Monday.....	110 1/2	110 1/2
Tuesday.....	110 1/2	110

Of the market for general bonds we can only say that it is dull and barely steady, closing at prices given below. Railroad mortgages were dull, but prices are firmly maintained by holders. The stock market, also, is dull and heavy. The principal dealings have been in the stocks which usually enjoy the greatest amount of speculative activity, but transactions have been comparatively small. We quote below the highest and lowest of to-day's prices.

The United States Marshal has printed a complete list of the creditors of Jay Cooke & Co., with amounts claimed. The following is a summary of the different classes of obligations, with number and amount:

Philadelphia house, No. 1,437, amount.....	\$3,408,410
New York house, No. 734, ".....	4,584,134
Washington house, No. 734, ".....	667,589

Secured liabilities:  
Philadelphia house, No. 17, amount..... 1,174,774  
New York house, No. 2, "..... 18,311

Total numbers..... 2,930, amount..... \$9,848,250  
It should be remembered that of the above claims there about \$2,000,000 which are fully offsetted, and for which the holders retain ample collateral. This will greatly reduce the actual indebtedness.

The following shows the movements in foreign trade for the week, so far as reported at the time of this writing:

	1871.	1872.	1873.
Tot. for week.....	\$5,235,080	\$6,912,075	\$5,008,951
Prev. reported.....	\$62,439,302	\$67,942,737	\$68,978,276
Since Jan 1.....	\$367,674,332	\$414,154,582	\$378,987,227

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils.....	50	\$423
Brass goods.....	19	\$2,485
Chains and anchors.....	213	10,333
Cutlery.....	73	27,431
Bronzes.....	9	5,009
Gas fixtures.....	6	3,172
Grates.....	74	30,385
Hardware.....	46	5,381
Iron hoop, tons.....	15	1,148
Iron pig, tons.....	59	1,620
Iron sheet, tons.....	45	10,352
R. R. bars.....	10,577	208,231
Iron cotton ties.....	4,000	7,486
Iron, other, tons.....	337	14,784
Lead, pigs.....	5,616	8,800
Metal goods.....	221	23,293
Needles.....	15	8,800
Old metal.....	19	575
Plated ware.....	2	844
Steel.....	19	45,569
Silverware.....	13	1,132
Tin, boxes.....	18,336	147,067
Tin, 3555 slabs.....	331,503	70,616
Wire.....	49	5,847
Zinc.....	110,976	8,549

Total for the week.....	\$415,941
Previously reported.....	47,325,162
Total since January 1.....	\$47,741,043

Government bonds closed as follows:

	Bid.	Asked.
U. S. 1881, reg.....	115 1/2	115 1/2
U. S. 1881, cou.....	113	113 1/2
U. S. 5-20 1882, reg.....	113	113 1/2
U. S. 5-20 1882, cou.....	113	113 1/2
U. S. 5-20 1884, cou.....	114 1/2	115
U. S. 5-20 1885, cou.....	114 1/2	115
U. S. 5-20 1886, cou., Jan. and July.....	117	117 1/2
U. S. 5-20 1887, cou.....	117 1/2	118
U. S. 5-20 1888, cou.....	117 1/2	118
U. S. 10-40 reg.....	110	111
U. S. 10-40 cou.....	111	111 1/2
U. S. Currency Pacific.....	112 1/2	113 1/2
New 5s, 1881.....	110 1/2	111

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated.....	95 1/2	95 1/2
Lake Shore.....	75	74 1/2
Rock Island.....	97 1/2	97
Western Union Telegraph.....	73 1/2	73
Northwestern.....	54 1/2	53 1/2
Northwestern Preferred.....	68 1/2	68
Milwaukee & St. Paul.....	40	39 1/2
Milwaukee & St. Paul Preferred.....	62 1/2	62
Pacific Mail.....	37 1/2	36 1/2
Ohio & Mississippi.....	29 1/2	29
Boston, Hartford & Erie.....	8 1/2	8
Union Pacific.....	26 1/2	26
C. C. & Ind. Central.....	26 1/2	26
Atlantic & Pacific Preferred.....	13 1/2	13
Hannibal & St. Joseph.....	26 1/2	26

## GENERAL HARDWARE.

A number of the principal Hardware manufacturers have held several meetings within the past few days, adjourning to-day sine die. The sentiment in regard to maintaining present prices was unanimous at all their meetings; but differences on other matters led to their separation without taking any concerted action.

Russell & Erwin Mfg. Co., William Wilcox & Co. and Mallory, Wheeler & Co. have advanced their Padlocks to discount 35 and 2 per cent., instead of 40 and 2 per cent. previously. In regard to the advance in Locks reported in our last, it has since become known that an additional 5 per cent. may be given to such houses as may be considered entitled thereto. An altogether new price list is in preparation, which will be issued on or about the first of January, and the discount will, we are informed, be 50 per cent. Borax has still further declined. We quote now 19 cents per lb. in 100 lb. cases, and 18 cents per lb. in barrels.

The condition of the Foreign Hardware trade is unchanged since our last writing. The

comparison of the month's business with that of the same period in previous years is more satisfactory than was generally anticipated. Advances from Birmingham of a recent date report the market for heavy goods, such as Chains and Anvils, firm, with an upward tendency. The Chain makers report heavy orders on their books for the United States, mostly taken before the recent advance mentioned two weeks since in these columns.

During the past week a fair business has been done in Nails, doubtless owing to the belief that any change in the price is more likely to be on the ascending than the descending side. We are assured by competent authority that Nails sold at the minimum rate now ruling, net the manufacture, on actual loss. If this is the case, it is reasonable to suppose that, with the return of activity in this department, prices will be re-established on at least a paying basis. We continue the quotation of last week, viz., \$4.25 for 10d. in small or large lots; for a car load, say, 300 kegs and upward, this figure could be shaded without difficulty.

Trade in House-Furnishing Goods is without important feature. There is a general tendency to firmer prices for Stamped Tin Ware, although no advances are as yet reported. Smith, Burns & Co., No. 46 Cliff street, quote their Japanned Chamber Pails at the following list, discount 10 per cent.:

No.	2	3	4	5
Green, per doz.....	\$9.00	9.00	10.00	12.50
Oak.....	9.00	10.50	10.00	13.50

Hogan, Clark & Sleeper, No. 105 Broad street, Boston, have opened a Commission Hardware house at No. 82 Chambers street, New York. They have been appointed sole agents for the Washoe Tool Manufacturing Company's patented "Adze Eye" Tools, and have issued a handsomely illustrated catalogue of these goods for 1874. The principal goods manufactured by this Company are Railroad and Miners' Tools, Picks, Mattocks, Coopers' Adzes, Axes and Hatchets of all kinds; they also manufacture Pick and Axe Handles. In preparing their new catalogue the list price remains as before, while the discount is increased. The revised discounts are given below:

	Dis. per cent.
Railroad Picks.....	25
California or Miner's Picks.....	20
Coal Picks.....	20
Eyes all ready for the steel.....	20
Mattocks.....	20
Coopers' Adzes.....	20

The above discounts are for full cases of two dozen.  
Total parties whose purchases exceed twenty-five dozen for the six months ending July 1st and January 1st, a further discount of 10 per cent. will be made. Goods will be delivered at depot in New York. Hogan, Clark & Sleeper will represent in New York, beside the goods mentioned above, The Taunton Tool Co., The International Screw Co., and a Lock concern. They will also issue, early in 1874, a comprehensive catalogue of General Hardware, containing over 500 pages.

We have received from Walsh & Brother, Philadelphia, the following revised price list of their goods, which will be seen to contain the prices of a number of articles never before printed in their list. Fernald & Sise are the New York agents of this firm. We have designated the new goods. The only change in the old goods is in No. 300, which is now \$2.25, instead of \$2.

"BEACH'S CURRY COMBS."  
Open Backs—Iron, Japanned.

No. 1, 6 Bars.....	per doz., \$1.35
No. 2, 6 " extra size.....	1.55
No. 3, 6 " ".....	2.00

Closed Backs—Iron, Japanned.

No. 4, 6 Bars.....	per doz., \$1.55
No. 5, 6 " extra size.....	1.75
No. 6, 6 " ".....	2.25

Open Backs—Brass Bars.

No. 7, 6 Bars.....	per doz., \$2.50
No. 8, 6 " extra size.....	2.80
No. 9, 6 " ".....	3.10

Closed Backs—Brass Bars.

No. 10, 6 Bars.....	per doz., \$2.75
No. 11, 6 " extra size.....	3.10
No. 12, 6 " ".....	3.50

Open Backs—Galvanized Bars.

No. 13, 6 Bars, extra size (new).....	per doz., \$1.25
No. 14, 6 " (new).....	1.25

Closed Backs—Galvanized Bars.

No. 15, 6 Bars, extra size (new).....	per doz., \$2.10
No. 16, 6 " (new).....	2.50

BEACH'S GALVANIZED CURRY COMBS.

No. 19, similar to Beach's No. 1.....	per doz., \$1.90
No. 20, " " No. 2.....	1.95
No. 21, " " No. 3.....	2.40
No. 22, " " No. 4.....	1.85
No. 23, " " No. 5.....	2.20
No. 24, " " No. 6.....	2.70

PHILADELPHIA CURRY COMBS.

Straight Shank, one Knocker, Yellow Handle.	
No. 66, 6 Bars, Japanned (new).....	\$1.90
No. 68, 6 " ".....	1.90

Iron Japanned, two Knockers.

No. 100, Crank Shank.....	\$1.60
No. 200, Trowel.....	1.85

Tinned.

No. 150, Trowel Shank.....	\$2.00
Extra Finished, Japanned.	
No. 237, Crank Shank (new).....	\$2.25
No. 238, Trowel.....	2.25

Iron Japanned, Fancy Pattern.

No. 300, 6 Bars, Crank Shank (formerly \$3).....	\$2.25
No. 400, 6 " Trowel.....	2.25

Extra Finished, Japanned.

No. 230, 6 Bars, Crank or Trowel Shank (new).....	\$3.00
Trowel Shank, four Knockers, Brass.	
No. 315, 6 Bars (new).....	\$2.40
No. 425, 6 " ".....	8.00

Sheet Tin.

No. 350, 6 Bars (new).....	\$1.50
No. 450, 6 " ".....	2.50

Iron Japanned, two Knockers.

No. 500, 8 Bars (new).....	\$2.35
No. 222, 8 " ".....	2.35

Tinned.

No. 550, 8 Bars.....	\$2.85
Extra Finished, Japanned.	
No. 233, 8 Bars, Crank Shank (new).....	\$3.75
Iron Japanned, two Knockers, extra size.	
No. 600, 8 Bars, Crank Shank.....	\$2.50

Iron Japanned, two Knockers.

No. 700, 8 Bars, Trowel Shank.....	\$2.45
Tinned.	
No. 750, 8 Bars, Trowel Shank.....	\$2.95
Extra Finished, Japanned.	
No. 234, 8 Bars, Trowel Shank (new).....	\$3.75

Iron Japanned, two Knockers, extra size.

No. 800, 8 Bars, Trowel Shank.....	\$2.35
Galvanized.	
No. 850, 8 Bars, Trowel Shank (formerly No. 800, Galvanized).....	\$3.25

We print on our 13th page a handsome advertisement of Yerkes & Plumb, of Frankford, Philadelphia, illustrating the principal goods of their manufacture. It will not be out of place to give our readers a brief history of this establishment, which occupies an important position among the Edge Tool and Hammer works of the country. Mr. J. Yerkes commenced the manufacture of these goods in 1857, at Verree's Mills, under the firm name of J. Yerkes, with J. P. Verree as special partner. This partnership continued until 1869, when Mr. Yerkes sold his interest to Mr. Verree, and associating with Mr. F. R. Plumb, purchased their present factory site at Frankford, a suburb of Philadelphia, directly on the line of the Pennsylvania Railroad, at Frankford Station. Their facilities for shipping and receiving supplies are unsurpassed; from their own doors they can ship direct to any part of the United States or the Dominion of Canada, while their supplies of iron, steel, coal, grindstones, &c., are landed at the factory on their own siding without change of cars. The factory is of brick, 160x40 feet with wing 40x40, together with the necessary outbuildings for storage &c. The power is furnished by a fifty horse engine and tubular boiler, the water of which is supplied by an artesian well on the premises. The machinery, some of which was invented and patented by the firm, is of the most approved kind. This establishment manufactures for the Hardware trade a full line of Carpenters' Hammers of every grade, from Wrought Iron to solid Cast Steel, and make a specialty of Ball Pein and Machinists' Hammers, Railroad Sledges, &c., which are made only of Solid Cast Steel and are fully warranted. Their full line of Shingling, Lathing, Claw and Broad Hatchets are finely finished goods, and will compare favorably with the best known brands in the market. Owing to the great difficulty experienced in obtaining second growth hickory handles running clear and white, they have added the necessary machinery for making their own handles, and we saw in their store an abundance of second growth hickory in the log. The goods of this establishment have already found a market in every city of importance in the United States and Territories; a considerable trade is also done with Canada, South America and Australia. In the year so nearly ended over \$100,000 worth of goods have been turned out. They have run through the panic on full time, principally on orders, and we can say from personal observation that very little stock has been accumulated. As is usual at the close of the year, the factory will shut down for a few days for repairs, when some new machinery will be put in place, by which the productive capacity for 1874 will be considerably increased. We are informed that no change will be made in the prices now ruling and as English Steel enters largely into the manufacture of their specialties, it is not likely that values can depreciate for a long time. The factory is reached by street cars and dummy from Philadelphia, or by the Pennsylvania Railroad. The Post Office address is Frankford, Philadelphia.

We have received the following report of a meeting of Table Cutlery manufacturers, held last week:

To the Editor of The Iron Age: A meeting of the manufacturers of Table Cutlery and Butcher Knives was held at the office of Hermann Boker & Co., in New York city, on Thursday and Friday of this week, Dec. 18 and 19, for the purpose of regulating the price of Table Cutlery and Butcher Knives for the ensuing year. Active competition had so cut the prices on the leading lines of goods as to afford no margin for the manufacturer, and many goods were sold below cost of production.

The sentiment of the meeting was not in the interest of an advance on prices, which have been found more than able to keep out foreign goods, but rather to the end of regulating and harmonizing the prices of all American manufacturers.

The necessity of action was apparent and readily admitted by the representatives of the companies who were present. The utmost harmony and good feeling prevailed, and the business of the meeting was promptly dispatched. There were represented:

Lander, Fray & Clark,  
John Russell Cutlery Co.,  
Lamson & Goodnow Mfg. Co.,  
Meriden Cutlery Co.,  
Beaver Falls Co.,  
New York Knife Co.,  
Northampton Cutlery Co.,  
Chicago Cutlery Mfg. Co. (by letter).

These companies, with perhaps one exception (who, through omission to notify, knew nothing of the meeting), the manufacturers of this country. Yours, respectfully,  
D. C. G. FIELD,  
Treasurer John Russell Cutlery Co. and Secretary of the meeting.

Dec. 19, 1873.

Sidney Shepard & Co., Buffalo, N. Y. have recently issued a circular illustrating their Patent Zinc Platform for printing presses. These goods are made in the same style as their Store Boards, and are admirably adapted for use in printing offices.

W. & B. Douglas, the well known Pump manufacturers of Middletown, Conn., have sent us a handsome chromo advertising their Pumps, Hydraulic Rams, Garden Engines, &c. The picture is mounted on card board, 30x24 inches.

## IRON.

American Pig.—Since our last the market has been stiffening, and now the cheap lots are almost, if not entirely, off the market. In Foundry Irons there has been little movement, because there was scarcely any offering for present delivery, and the companies refuse to sell for future delivery, stating that as present prices are not remunerative, they will not make contracts at them. Sales have been made during the week from first and second hands, at \$34 @ \$35 for No. 1 Foundry, and \$31 @ \$33 for No. 2 Foundry. Gray Forge is held more firmly. We note the sales of 4000 tons at equal to \$29, at Hoboken, by the Thomas Iron Company, which is now out of the market in this grade. This company will begin the new year without any iron on hand, if cars can be had to carry it away, and nearly

all the other companies are fully sold. 600 tons White and Mottled sold at \$24 at works. We quote No. 1 Foundry, \$35; No. 2 Foundry, \$31 @ \$33; Gray Forge, \$27 @ \$28, at works. The Thomas Iron Company refused \$29 for 1000 tons Gray Forge, delivered at Hoboken. White and Mottled, \$24 at works.

Scotch Pig.—The demand for Scotch Iron has been light. A cargo of Eglinton arrived within the week, the greater part of which was sold previous to arrival on private terms. We note sale of 200 tons from ship, at \$42 @ \$43. There have been no arrivals of other brands, of which the stock is light. We quote: Glengarnock, \$48 @ \$44; Coltness, \$45 @ \$46; and Gartsherrie, \$43.

Bar.—There is no change in the position of the Bar Iron market. We quote, without change, 3c. @ 3 1/4c. from mill.

Rails.—The stagnation which has marked the Rail market for a long time still continues, and English may be quoted, nominally, \$57 @ \$60, gold. American we quote \$60 @ \$63, currency, at works. Sales have been reported at the latter price, and we hear of them being offered at the former.

Old Rails.—The market has been dull, but the advance noted in our last is maintained. We quote \$40, currency.

Scrap.—Holders are stronger in their views, and we quote No. 1 Scrap from yard, \$40 @ \$45, the latter price being asked by some holders, but we hear of no sales at this figure.

## METALS.

Copper.—The market for Ingot remains very quiet, and there are only a few transactions to report. At this particular season of the year manufacturers do not care to increase their stocks, unless the state of the market offers special inducements to do so, and at present there are no influences of this nature at work. Prices are firmly maintained at the rates ruling last week. We report sales of 200,000 lbs. Lake, in lots, at 24c. @ 24 1/2c., cash; 150,000 lbs. at 24 1/2c., cash; and 50,000 lbs., for February delivery, at 25c. The closing quotations are 24 1/2c. @ 25c. for cash, and 25 1/2c. for January and February delivery. Manufactured Copper is selling in moderate quantities at the regular list prices, and there is at present no indication of change in the quotations. Yellow Metal is steady, and there is no alteration to note in prices.

Tin.—There has been but little business doing in Pig Tin during the week, and prices generally remain firm, with a slight advance in English. The prevailing condition of the market is quiet, and during the last day or two there has been an almost entire absence of transactions. The sales comprise a small lot of Malacca, on the spot, at 28 1/2c., 5 tons English L. and F. at 26 1/2c., and 15 tons do., to arrive, at 26 1/2c. @ 26 3/4c. The quotations to-day are: Billiton, 28c.; English L. and F., 26 1/2c. @ 26 3/4c.; English Refined, 27 1/2c. @ 27 3/4c.; and Straits, 28 1/2c. @ 28 3/4c., all gold. Cable dispatches from England quote L. and F. at \$123. There has been a moderate business in Plates, and prices are fully maintained. Advances from Liverpool report the market there as favorable to holders on this side, as the prices current here are relatively higher than those quoted there, Charcoal Tin being reported at 37 @ 40, and Best Coke at 30 @ 35. The English makers are said to be at all sold ahead, and some of them to the end of March. We note sales of 1500 boxes Charcoal assorted at \$10.25, and 250 boxes at \$10.50, 1000 do. for future delivery at \$10.50, 500 do. L. C. W. at \$7.50 @ \$7.62 1/2, 500 do. L. C. Coke at \$3.75, 500 prime Coke Terne at \$5.50, 1000 do. Charcoal Terne at \$9.50, and 250 do. do. at \$9.75, all gold.

Lead.—The market for Pig remains very quiet, and prices are nominally the same as previously noted. Spanish is quoted at 6 1/2c. @ 6 3/4c., gold. The quotations for domestic are 5 1/2c. @ 6 1/2c., gold. A sale of 50 tons is reported, but the price has not transpired. Manufactured is steady at unchanged quotations.

Spelter and Zinc.—The demand for Spelter is moderate, and Silician is quoted at 7 1/2c. @ 7 3/4c. The sales for the week amount to 60 tons Silician at the figures named, and 25 tons Western on private terms. Sheet Zinc is in fair supply at 8 1/2c. @ 8 3/4c., gold.

Antimony.—There is very little demand for Regulus, and the prices are firm at 12 1/2c. @ 13c., gold. A sale of 5 casks is reported at 12 1/2c., gold.

## COAL.

The market has been since our last report exceedingly dull, and there is no prospect of much improvement in the demand for some time. Prices have been maintained, on the whole, at former rates, but we hear of occasional transactions where slightly







### The Serpent in Connection with Primitive Metallurgy.

A very curious and interesting paper on the Serpent in connection with Primitive Metallurgy, by Miss Buckland, was read at the British Association, at Bradford, from which we condense the following report:

Miss Buckland began by observing that, in considering the innumerable serpent legends which had descended from an immeasurable antiquity, they could not fail to be struck with the remarkable fact that by far the larger number represented the serpent, either as the guardian of hidden treasure and revealer of hidden knowledge, or as in some way connected with gold and gems. Pursuing their inquiries further, they found almost invariably that all the heroes and gods with whom the serpent was associated, were also credited with some mysterious power over riches, agriculture, and atmospheric phenomena. They were always the pioneers of civilization, the teachers of agriculture, and of mining. Their age was the golden age of the people over whom they reigned, and in all these instances the serpent Agatha Dæmon—the good and benevolent deity—sometimes the creator, almost always the first and oldest of gods or demi-gods, and in this character was generally accompanied by an egg or cone as an emblem of the world. But they found that this character of the serpent was confined to Turanian races, or to those nations who had at some time or other passed under Turanian influences. Among the Aryans and Semites, the serpent was looked upon as a form of evil, although this idea was modified in many cases by a survival of primitive belief, so that in Hindustan he was still regarded with veneration, although the origin of that veneration was generally traced to aboriginal tribes. It would, therefore, appear that the serpent might yet become a very important ethnological guide, and being traced back to the age of totemism, and read by the light of legends confirmed by early monuments, it might be assumed that the primitive tribe or tribes bearing the serpent as a token, were also the first metal workers, and had acquired their knowledge of metals in some way through the instrumentality of the token, for that reason so highly and widely venerated. It would also appear that those early serpent tribes carried their knowledge from the parent hive, probably in Central Asia or India, where the precious metal abounded, across Asia, Africa, Europe, and even to America, leaving traces everywhere in serpent symbols, serpent mounds, megalithic monuments, and the earliest traces of metallurgy, confined, however, to the use of the three precious metals in their pure unsmelted form. But it would further appear that the connection with America was broken before smelted metals and iron became known, the art of smelting having probably been an accidental discovery of the Aryan successors of the early serpent tribes. This serpentine origin of metallurgy it was endeavored to set forth at some length in the above paper, as it was believed that it was a matter worthy of investigation, being apparently confirmed by the present veneration of the serpent existing among Turanian races, and the absence of serpent traditions among savage living in a purely stone age, excepting in the Fiji Islands, where the inhabitants bore traces of great admixture with Asiatic tribes.

The following is a synopsis of the discussion which followed:

Dr. Hume, among other observations, thought that a good deal of learning on this subject had been to a certain extent wasted. They had now discarded altogether the theory held for many years that America was peopled at one point, and in the long range of country which they had from near the North Pole to down far into the southern temperate zone it was quite evident that America must have been reached at various points. That metals were known, to a certain extent, before the time of Columbus was quite certain, and it was quite probable that some of the nations of the older continent who migrated over to America might have introduced serpent worship, though he had never heard or seen any traces of it in South America, where the Peruvian nation would be very likely to have shown it.

Mr. Conway said, with all respect to the traditional knowledge women were supposed to have in connection with the serpent, there was very little foundation, indeed, for supposing that the very mythological character of the serpent was at all connected with the metals with which the serpent became associated. In the earlier days the serpent was worshipped on account of its deadliness, but its connection with wealth arose from its becoming a metaphor for a cloud, and as the rain brought forth the wealth of the earth, so the serpent was supposed to guard the treasures of the earth. The snake was associated among the negroes in all countries with rain, and rain was the origin of the production of the wealth of the earth. On this belief no doubt the jeweled character of the marks upon the serpent had a great deal of influence—for the serpent came from a hole, and seemed to bear upon its back the gems of the earth, as if it were the custodian of its jewels. No doubt these made all poetic metaphors in olden times, and they gradually hardened into myths.

Dr. Ginsburg pointed out that in Hebrew the words signifying "serpent" and "brass" or "metal" were exactly the same. The root and meaning of the word in both cases were alike, so that there seemed to be some connection between metal and the serpent. He suggested that the fact that the serpent was able to coil itself into a circle caused it to be worshipped as the emblem of eternity, for the ring was the emblem of eternity.

Mr. Phene said the paper did not touch upon the question as to whether America was peopled from one or more points. The intent of the author was simply to show that serpent

worship was a matter of very ancient faith and custom, and she brought forward evidence to prove that the nations who had addicted themselves to this worship were metallurgists. The metals which they used were certainly those metals which were used in a primary state, and if so there was no very far-fetched idea in supposing that there was a connection between the worship of the serpent and the use of metals in the minds of people who worshipped the serpent and used metals in the first instance.

The Danville American of last week says: The Pennsylvania mills, which for some time have only been running on part time, were entirely closed on last Saturday night, and the prospect for the future is anything but encouraging. No orders whatever have been received since the 1st of November, and such as were received for a month previous to that date, of a trifling character. Waterman & Beaver have now on hand 3000 tons of puddled bar and tops and bottoms, 1500 tons of old rails and 2500 tons of pig iron, which, in addition to the regular yield, would keep them in stock for a year, if times should brighten up so as to warrant the running of the works at their full capacity. Under these circumstances, and with the present prospect, it does not seem best to them to keep on stocking up iron even at the present low price of wages, when the interest on the stocked iron more than absorbs the difference in the cost of labor, and it is doubtful whether labor or any other commodity will ever rebound to its former high price. No. 8 furnaces, of the Pennsylvania Works, has been out of blast for some weeks. Chulasky furnace will also be blown out, and Nos. 2 and 4 will be kept running all winter, though even this crumb will depend somewhat upon the contingencies. The possibility is that the mills will resume operations about the first of the New Year, and we earnestly hope that such may be the case.

Shultz's chronoscope, used in estimating the initial velocity of a cannon ball, measures an interval of time to within one fifty-thousandth of a second.

### London Metal Market.

(From The Mining Journal.)

Copper—# ton.	£.	s.	d.	¢.
Best Selected	84	0	0	0
Foundry Cake & Fine	82	0	0	0
Sheeting and Sheets	80	0	0	0
Boiler	78	0	0	0
Bottoms	76	0	0	0
Old	74	0	0	0
Burnt Bar	72	0	0	0
Wire	70	0	0	0
Tubes	68	0	0	0
Brass—# ton.	0	0	0	0
Sheet	0	0	0	0
Wire	0	0	0	0
Tubes	0	0	0	0
Yellow Metal Sheet	0	0	0	0
Sheets	0	0	0	0
Spelter—# ton.	27	10	0	0
Foreign on the spot	25	0	0	0
to arrive	23	0	0	0
Zinc—# ton.	20	0	0	0
In Sheets	18	0	0	0
Quicksilver—# bottle	20	0	0	0
Tin—# ton.	119	0	0	0
English Blocks	120	0	0	0
Ditto Bar (in box)	122	0	0	0
Ditto Refined	122	0	0	0
Banc	117	0	0	0
Strait	118	0	0	0
Tin Plates—# box.	1	18	0	0
IC Charcoal	1	14	0	0
IX " "	1	14	0	0
IX " "	1	14	0	0
IX Coke	1	14	0	0
IX " "	1	14	0	0
Canada Plates—# ton.	21	10	0	0
at works	20	0	0	0
Iron—# ton.	12	0	0	0
Bar, Welsh, in London	12	0	0	0
to arrive	12	0	0	0
Nail Rods	12	0	0	0
Nail Rods, Staff in London	12	0	0	0
Bars	12	0	0	0
Hoops	12	0	0	0
Bars at Works	12	0	0	0
Hoops ditto	12	0	0	0
Sheets, single	12	0	0	0
Fig. No. 1, in Wales	12	0	0	0
Refined metal ditto	12	0	0	0
Bars, common ditto	12	0	0	0
Do. merchant, Tyne or Tees	12	0	0	0
Ditto, Railway, in Wales	12	0	0	0
Ditto, L.B., Tyne or Tees	12	0	0	0
Ditto, No. 3, 4, L.B.	12	0	0	0
Railway Chairs	12	0	0	0
Spikes	12	0	0	0
Indian Charcoal Pigs in L'lon	10	0	0	0
Steel—# ton.	21	0	0	0
Swedish, in kegs (rolled)	21	0	0	0
Ditto (hammered)	21	0	0	0
Ditto, in ingots	21	0	0	0
English, spring	21	0	0	0
Lead—# ton.	24	0	0	0
English Pig, common	24	0	0	0
Ditto, L.B.	24	0	0	0
Ditto, W.B.	24	0	0	0
Ditto, Sheet	24	0	0	0
Ditto, Red Lead	24	0	0	0
Ditto, White	24	0	0	0
Ditto, Patent Shot	24	0	0	0
Spanish	24	0	0	0

At the works, 1s. to 1s. 1d. per box less. Terms plates 3s. per box below tin plates of similar brand. 7 Nominal. Add 6s. for each X.

**Schweitzer Mfg. Co.,**  
57 Reade Street, New York.



### CONTINENTAL LOCKS.

Made of Wrought Iron or Brass, very superior in quality, and only an angler used in mortising.

**SCHWEITZER PAD LOCKS,**  
**EXCELSIOR COMPASSES,**  
**EXCELSIOR DIVIDERS,**

**STUBS' STEEL POINTS,**

Best and Cheapest Goods in the market. Sole Agents for the United States for

**NEWBOULD'S FILES AND TOOLS**

**French Coffee Mills.**

**NOBLE MFG. CO.,** Tools, Ship Augers, &c.

**Emery, Waterhouse & Co.,** Shovels & Spades

We also make a superior

**AXE** "Queen of the Forest,"

**Diston's Saws** (Largest Stock in the City).

General dealers in

**FOREIGN & DOMESTIC HARDWARE.**

The American Turbine Water Wheel Recently improved, and submitted to thorough scientific tests, by James Emerson, showing the following useful effect of the power of the water utilized, being the highest results ever known.

PERCENTAGE OF PART GATE.					Per cent. of whole Gate.
50.08	69.04	78.73	82.53	82.90	83.14

A full report may be obtained of **STOUT, MILLS & TEMPLE, Dayton, O.**

## PYROMETERS for BLAST FURNACES.

**E. BROWN'S STANDARD PORTABLE,**  
**E. Brown's Improved Gauntlet**



**Edw. BROWN,**  
311 Walnut St., Philadelphia.

## PYROMETERS

For Baker's Ovens, Boiler Flues, Galvanizing Baths, Oil Stills, Vulcanizers, Superheated Steam.

**E. Brown's Portable Blast Gauge** for the plug hole, Steam Gauges, Blast Gauges, Mercury Gauges, Recording Steam Gauges, Engine Counters, Indicators for ascertaining the Horse Power.



Over 200 Gauntlets and 60 Portable Pyrometers are now in use at Blast Furnaces.

Circulars on application.

**A. G. COES**  
PAT. DEC. 26, 1871.

Established in 1839.



## SCREW WRENCHES.

Our goods have been very much improved recently, by making the Bar W.D.E. as shown in the cut, which makes a 12 in. Wrench as strong as a 15 in. made in the ordinary way, and by using

**A. G. COES'**  
NEW PATENT

## FERRULE

Which cannot be forced back into the handle. Our goods are manufactured under Patents dated February 7, 1860, (re-issued June 29, 1871), May 2, 1871, and Dec. 28, 1871, and any violation of either will be vigorously prosecuted.

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

**A. G. COES & CO.**

**William N. Jennings,**  
**FINE PRINTING & STATIONERY,**

No. 43 Franklin Street,

Bet. Broadway & Elm St.,

**NEW YORK.**



**Putnam's Government Standard FORGED HORSE SHOE NAILS.**

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

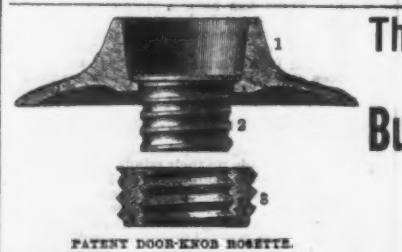
**S. S. PUTNAM & CO.,**  
NEPONSET, MASS.

**H. L. GREGG & CO.,**  
Ship Brokers & Commission Merchants, Importers of

**Old Iron, Metals and Rags.**

Freight engagements made to all parts of the world. Marine insurance effected in reliable offices.

**108 Walnut St., Phila.**



**PATENT DOOR-KNOB ROSETTE.**  
No. 1, Rosette.  
No. 2, Screw entering No. 3.  
No. 3, Stationary bushing remaining firmly in door.

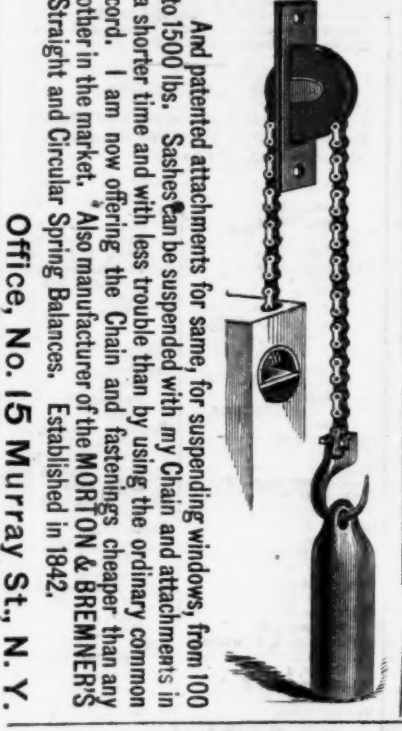
**BRASS & IRON FOUNDRY, SILVER & NICKEL PLATING.** Orders Solicited. We would call the particular attention of the trade to our PATENT IMPROVED ROSETTE for Door Knobs. This Rosette does away with the small screws and cannot work loose. It can be applied four to one faster than any others. Can be applied to old doors.

**Factory on the Valley R. R. at Wethersfield, Conn.**

Communication from Hartford (3 miles) by horse or steam cars.

**THOMAS MORTON,**  
Manufacturer of

**Brass & Copper Chain,**



## HOLLIDGE'S



## IMPROVED PIPE VISE.

I claim for this Vise the following advantages over all others:

**FIRST.**—Pipe can be held at any angle while being operated upon.

**SECOND.**—Pipe can be inserted side-wise with Ells or Fittings of any kind on each end, thus enabling the workman to take apart old and crooked Pipe without any trouble, and saving about one-half the room required to work other Vises.

**THIRD.**—It can be fastened in the middle of the work-bench and in this way allow the Pipe to rest on it, while all other Vises have to be screwed to the end of the bench or to a post in the floor so as to permit the stocks or cutter to pass clear.

The Vise is made very strong and durable, and the working parts arranged so as to present the greatest strength and resistance to wear.

The above is a fair representation of the Vise.

**FOR SALE BY**

**JNO. H. MCGOWAN & CO.,** Cincinnati, O.

**HARRIS, RICE & CO.,** St. Louis, Mo.

**OWENS, LANE & DYER MACH. CO.,** St. Louis, Mo.

**WERNER & ABLE,** St. Louis, Mo.

**HUNTINGTON, HOPKINS & CO.,** San Francisco, Cal.

**HUNTINGTON, HOPKINS & CO.,** San Francisco, Cal.

**MANUFACTURED AND SOLD BY**

**E. C. HOLLIDGE, Minneapolis, Minn.**

Liberal Discounts to the trade.

### Houston's Pat. Turbine Water Wheel.



**RIEHL BROTHERS,**  
Ninth Street, near Coates, Philadelphia.  
New York Store, 20 Liberty Street.  
Pittsburgh Store, 55 Wood Street.



**"The Celebrated Stock House Scale,"**  
New Style Testing Machines, all sizes,  
Frought Iron Lever R. R. Track Scales,  
Parallel Crane Beams and Mortising Machines.

### The Wethersfield Novelty Co.

MANUFACTURERS OF

**Builders' Hardware and Plated Goods.**

**BRASS AND IRON FOUNDERS.**

Particular attention given to Light Manufacturing for outside parties; also,

**BRASS & IRON FOUNDRY, SILVER & NICKEL PLATING.** Orders Solicited. We would call the particular attention of the trade to our PATENT IMPROVED ROSETTE for Door Knobs. This Rosette does away with the small screws and cannot work loose. It can be applied four to one faster than any others. Can be applied to old doors.

**Factory on the Valley R. R. at Wethersfield, Conn.**

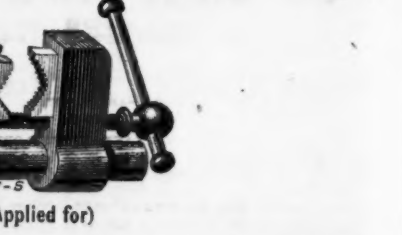
Communication from Hartford (3 miles) by horse or steam cars.

**COPPER AND ZINC SASH CHAIN.**

The Best and Cheapest made.



## BUILDERS' HARDWARE.



## Chain and Pulley for Heavy Sash.

**F. & L. MARY & MARSHALL,**

45 Warren Street, NEW YORK.

Manufacturers of every description of

Pure Brazed Metal and Hand-Plated Knobs, Hinges, &c.,

Agents for Gunter's Black Lead Compound.

Agency and Depot of the TRENTON LOCK COMPANY.



## THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent Increment Cut, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly expanding or increasing in size and space from the point, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "Increment File" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no regular Travelers, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

**NICHOLSON FILE COMPANY,**  
Providence, R. I.

## CAUTION.

It has just come to our knowledge that certain parties in the West are engaged in buying up WORN OUT FILES of our manufacture, and, after immersing them in an acid bath, selling the same in packages which have a label of the same color and general appearance as ours, and falsely stating as follows:

**NICHOLSON FILES,**

Providence, R. I.

Increment Cut.

Made from Best English Steel. &c.

Our friends and the public are cautioned against this deception, which we consider one of a most injurious character, not only to ourselves, but to all dealers and consumers who desire the

"NICHOLSON" FILES

as we produce them, as files so



treated are comparatively valueless for use.

We have taken steps to have the parties thus engaged in deceiving the public, and trading upon our reputation, presented to the Courts for treatment, and will thank our friends having information bearing upon this subject to notify us, promptly, of any parties who have sold, or are offering for sale, "Nicholson" files doctored and labeled as above described.

**Nicholson File Co.,**

W. T. Nicholson, Agent.

Providence, R. I., Sept. 25th, 1873.

All packages of NICHOLSON FILES leaving our works bear a label on green paper like the one herewith attached.

1816. 1844. 1850. 1868.  
H. F. F. H. F. F. & SON. P. A. F. P. A. F. & CO

**PETER A. FRASSE & CO.,**

95 Fulton Street, New York,  
IMPORTERS OF

**Stubs' Steel Wire, Files and Tools,**

Grobet Swiss Files,

Extra Quality English Spring Steel Wire,

Nos. 1 to 34.

Steel Wire for Sewing Machine Needles and for other Purposes,

French Cold Rolled Sheet Steel,

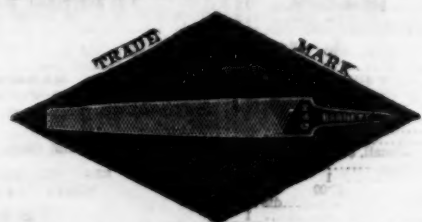
Sizes, 22 to 36 Gauge.

Jewelers', Engravers' & Mechanics' Tools.

The only Agents in the United States for

**HUBERT'S CELEBRATED FRENCH EMERY PAPER.**  
For Hatters' and Machinists' Use.

**Black Diamond File Works.**



G. & H. BARNETT,

39 41 & 43 Richmond St. Phila.



**D. H. WHITTEMORE'S**  
Meat Cutter.

Cuts Everything for the Family.

Works extremely easy. The smallest size will cut one pound of Sausage Meat per minute, two pounds of Pie Meat per minute, and fish for a family meal in one half a minute. Price, \$20 per dozen. Hotel size (three times the capacity). Price, \$75 per dozen. Have been sold for one year. The highest premiums were awarded on each of the two times at the New England Fair, in Boston, in 1873. Packed Half Dozen in Case.

MANUFACTURED AND SOLD BY

D. H. WHITTEMORE, Worcester, Mass.  
ALSO SOLD BY

CLARK, WILSON & CO., 61 Beekman St., N. Y.

**WILLIAMS WHITE & CHURCHILL,**  
Successors to  
MACKRELL & RICHARDSON MFG. COMPANY,  
Manufacturers of

**Builders' Hardware,**

Locks, Hinges, Hooks and Staples,  
Awning Hooks, Meat Hooks, Pincers,  
Champion Noiseless Pulleys,  
CHAIN PULLEYS, &c.

Factory, cor. Flushing and Nostrand Avenues  
BROOKLYN.  
Warehouse, 73 Warren St., N. Y.

**THOMAS TURNER & CO.'S**  
HORSE RASPS,

The best in use. All sizes on hand and for sale by  
**JOHN I. BROWER & SON**  
Hardware Merchants,  
255 Greenwich St., N. Y.

## LANE, GALE & CO

SOLE AGENTS

FOR

TROY WRO'T BUTT CO'S Wrought Iron Butts (Riveted Pin).

THE EAGLE SQUARE CO'S Steel and Iron Squares.

E. F. HURD'S AXES, HATCHETS, ADZES, &c., &c.

G. T. LANE'S PLANTERS' HOES.

AGENTS FOR

BURDEN'S HORSE and MULE SHOES.

E. W. GILMORE'S STRAP and T HINGES.

SCOVIL MFG. CO'S BRASS BUTTS.

J. M. KING'S STOCKS & DIES.

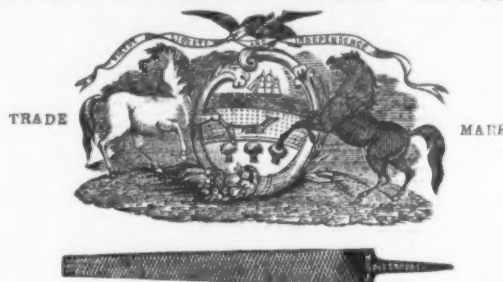
McCREA'S SHOE THREADS and TWINES.

G. F. ELLS' CURRY, CATTLE and PLANTATION CARDS.

ENAMELED and TIN WARE, &c., &c., &c.

TROY, N. Y.

PENNSYLVANIA FILE WORKS.



**McCAFFREY & BROTHER,**  
Manufacturers of FIRST QUALITY FILES and RASPS ONLY,  
Nos. 1732 & 1734 North Fourth Street, Philadelphia, Pa.

**G. W. Bradley's Edge Tools.**

Butchers' Cleavers, Axes and Hatchets,  
Bush Hooks, all patterns, Grub, Garden & Planters' Hoes,  
Turpentine Tools, all kinds, Mill Picks, Mattocks & Picks,  
Coopers' Tools, a specialty, Box Scrapers & Chisels,  
Ship Carpenters' Tools, Cotton Hooks & Samplers.

N. WEED. 37 Chambers St.

**FERNALD & SISE,**

100 Chambers Street, NEW YORK.

HARDWARE MANUFACTURERS' AGENTS,

Reading Hardware Co. Barnes & Deitz. Underhill Edge Tool Co.  
Crooke & Co. Nathan Lock Co. Plumb, Burdick & Barnard.  
Yerkes & Plumb. Arcade File Works. Hotchkiss, Tuttle & Co.  
Hartie, Wiley & Co. William McNiece. Klein, Logan & Co.  
Vulcan Horse Nail Co. Langstroth & Crane. T. T. Rhodes.  
Walsh & Bro. Keystone Manufacturing Co. Orleans Scythe Stone Co.  
Moran & Sons. A. E. Young. Lakin Manufacturing Co.

**TURNER, SEYMOUR & JUDDS.**

MANUFACTURERS, IMPORTERS AND DEALERS IN

**Hardware and Upholsterers' Brass Goods.**

SOLE AGENTS FOR

L. L. Davis' Patent Levels, Stevens' Calipers and Dividers,  
Page's Auxiliary Jaws.

Manufacturers of Judd's, Prindle's and Combination Patent Curtain Fixtures, Locks and Curries' Patent  
Raisin Seeder, Patent Twine Boxes, Picture Nails and Hooks, Escutcheon Pins, Coat and Hat Hooks; also  
Miscellaneous Iron and Brass Goods.

Small Brass and Iron Castings made to order.  
64 Duane Street, NEW YORK.

**JAMES C. HAND & CO.**

COMMISSION MERCHANTS,

No. 614 & 616 Market Street, PHILADELPHIA.

AGENTS FOR:

William Penn, Reading and Norristown Pig Iron.  
Reading Iron Co.'s (Crescent Brand) Nails, Boiler Flues, &c.  
Bar Iron, Plow Steel and Iron, South Easton Iron Wire.  
Wm. Jessop & Sons' Steel and Norway Nail Rods.  
Barrows, Savery & Co.'s Hollow Ware. Castings, &c.  
Fisher & Norris' "Eagle" Anvils and Vises,  
Washington Mills Emery.  
Heavy Hardware, &c., &c.

**W. F. SHATTUCK & CO.,**

113 Chambers and 95 Beads Street, New York.

MANUFACTURERS OF AMERICAN HARDWARE.

Cox & Tait's Pat. Wrenches. Mouse Traps. Wire Selves. Yaw's Cow Bells.  
Axe, Pick, Sledge & Hammer. Scale Beams. Axes, Picks and Hatchets.  
Hatchets. Auger, Chisel & File. Patent Tap Borers. Hammer. Crow Bars.  
Handies. Climax Horse Collars. Bad Irons.  
Gimlets and Gimlet Bits. Maguire's Wrt Iron Goods. Boring Machines.  
Augers and Auger Bits. Shattuck's Platform Counter. Cast Iron Hatchets.  
Cocoa Nut Dippers. Scales. Coffee Mills.  
Star Steel Spoons.  
Hocks and Dies.



# New York Wholesale Prices, December 23, 1873.

## HARDWARE

[illegible]

*Superior	.....	dis 40 1/2			
*S. R. Superior Philadelphia	.....	dis 45 1/2			
<b>Coal Shovels.</b>					
Iron Handles	.....	doz 85 @ 1 1/2			
Woods Handed	.....	doz 1 00 @ 1 1/2			
<b>Coal Hods.</b>					
No. 14	15	16	17	19	
Common Japanese	\$7.00	\$7.50	\$10.00	\$12.00	\$15.00 per doz
Common Galvanized	\$8.00	\$8.50	\$10.00	\$12.00	\$15.00 per doz
Common Japanese	.....	dis 50 @ 10			
Galvanized	.....	dis 48 @ 10			
<b>Cooks.</b>					
Brass Backing	.....	dis 30 @ 10			
Lock and Globe	.....	dis 30 @ 10			
<b>Coffee Mills.</b>					
Board and Box	.....	dis 15			
Selors's Pat.	.....	new list dis 10			
French Steel	.....	dis 15			
Common	.....	dis 15			
Swiss	.....	dis 20 @ 25			
Swiss's	.....	dis 20 @ 25			
<b>Compasses and Dividers.</b>					
Best	.....	dis 15 @ 30 @ 15			
Best	.....	dis 30			
Pick stop & Willow	.....	dis 30			
<b>Coopers' Tools.</b>					
Bradley's	.....	dis 15 @ 20			
Common	.....	dis 15 @ 20			
<b>Corn Chives and Cutters.</b>					
Bradley's	.....	dis 15 @ 20			
<b>Cranbibles.</b>					
Gauntlett & Co.	.....	No. 5500			
<b>Curry Combs.</b>					
Hutchins & Kellogg's, Iron and Brass	.....	dis 15			
Fitch's	.....	dis 15			
Common	.....	dis 15			
Hubber	.....	dis 15			
<b>Curtain Mfg. Co.</b>					
Swiss	.....	dis 40 @ 10			
<b>Cutlery.</b>					
American Table	.....	dis 25			
American Pocket	.....	dis 25			
<b>Door Springs.</b>					
Common	.....	\$7.50 per doz—dis 40 @ 10			
Torrey's Patent	.....	\$7.50 per doz—dis 40 @ 10			
Miller's Japanese No. 8	.....	dis 40 @ 10			
" Silvered	.....	dis 40 @ 10			
<b>Changse.</b>					
Common	.....	dis 84 @ 10 @ 600			
Bronzed	.....	dis 5 @ 10 @ 700			
Stainless Plated	.....	dis 5 @ 10 @ 700			
Common	.....	dis 5 @ 10 @ 700			
Growing lots	.....	dis 30			
<b>Drawling Knives.</b>					
Common	.....	dis 60 @ 60 @ 10			
Bradley's	.....	dis 60 @ 60 @ 10			
<b>Drills.</b>					
Imperial	.....	dis 25			
Moore's Triple Acting Ratchet	.....	dis 30			
<b>Key Hangers.</b>					
Common	.....	dis 25 @ 30 @ 300			
Ashley's	.....	dis 25 @ 30 @ 300			
Barley's Patent	.....	dis 25 @ 30 @ 300			
Common	.....	dis 25 @ 30 @ 300			
National	.....	dis 25 @ 30 @ 300			
Peerless	.....	dis 25 @ 30 @ 300			
<b>Gauntlett Chester Regular No.</b>					
Flour and F.F.	.....	dis 5 @ 10			
Washington Mill Regular No.	.....	dis 5 @ 10			
" Flour	.....	dis 5 @ 10			
<b>Enamelled and Tinned Ware.</b>					
Common	.....	dis 10			
Sauce Pan, Glass Pot & C.	.....	dis 15			
France's	.....	dis 15			
Common	.....	dis 15			
Star	.....	dis 15			
Cork Stops	.....	dis 15			
Star	.....	dis 15			
Fray's Patent Petroleum	.....	dis 10 @ 10			
Taylor's Patent	.....	dis 10 @ 10			
Woolworth's	.....	dis 10 @ 10			
<b>Files.</b>					
Nichols	.....	\$3.00 to 4 currency—dis 14 1/2			
J. & J. City Car	.....	dis 14 1/2			
Stabs	.....	dis 14 1/2			
Butcher's	.....	dis 14 1/2			
Spear & Jackson's	.....	dis 14 1/2			
Common	.....	dis 14 1/2			
Jewell's	.....	dis 14 1/2			
W. Weston	.....	dis 14 1/2			
R. D. Bolton	.....	dis 14 1/2			
Bean & Murray, Cyclops	.....	dis 14 1/2			
Goodie	.....	dis 14 1/2			
Moss & Gamble	.....	dis 14 1/2			
<b>Fluting Machines.</b>					
Acme	.....	\$7.00 each net			
Acme, No. 2	.....	7.00 each net			
Knott, with 4-inch Roll	.....	5.00 each net			
O. K.	.....	6.00 each net			
Fourless, 4-inch Roll	.....	4.00 each net			
Acme, No. 1	.....	4.75 each net			
Acme, No. 2	.....	6.00 each net			
Diamond 4-inch Roll	.....	8.00 each net			
Emery	.....	6.00 each net			
Bureau, No. 1 1/4-inch Roll	.....	6.00 each net			
Bureau, No. 1 1/2-inch Roll	.....	6.00 each net			
K. F. M.	.....	6.00 each net			
Myers' Fasten Fluter, 4 1/4-inch Roll	.....	9.00 each net			
Domestic Fluter	.....	\$1.75 each net			
Fly, Self-Feeder	.....	10.00 each net			
Domestic Fluter	.....	\$1.75 each net			
Ponty Fluter, Bright	.....	\$1.50 each net			
Common Hand Fluter	.....	\$1.00 each net			
Fry Gana-F. S. & W.	.....	\$1.25 each net			
<b>Hammer.</b>					
Smith, Burns & Co., Excelsior	.....	dis 30			
Common	.....	dis 30			
<b>Hammers.</b>					
Excelsior Co.	.....	dis 10			
Maydole's	.....	new list dis 10			
Cheney's	.....	new list dis 10			
Yerks & Plumb	.....	dis 10			
Minot & Co.	.....	dis 10			
<b>Hand.</b>					
Hammer and Hatchet	.....	dis 10			
Quakerstown, Axe, Pick and Sledge	.....	dis 10			
Common	.....	dis 10			
Greensboro, Axe, Pick, Hammer, & C.	.....	dis 10			
Woolworth, Axe, Pick and Sledge	.....	dis 10			
<b>Harness Snaps.</b>					
Jackson	.....	dis 40			
Fitch's	.....	dis 30			
Hutchins	.....	dis 10			
Hull's, Japanese	.....	dis 10			
Hull's, Tinned	.....	dis 30 @ 10			
<b>Hatchets.</b>					
Isiah Blood	.....	dis 10			
Shingling, No. 123	.....	dis 10 1/2			
Latting	.....	dis 10 1/2			
Hunt's	.....	dis 10 1/2			
Claw	.....	dis 10 1/2			
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Latting	.....	dis 10 1/2			
Hunt's	.....	dis 10 1/2			
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Shingling, No. 123	.....	dis 10 1/2			
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Screws.	
Flat Head Iron	..... dis 47 1/2
Round Head Iron	..... dis 48
Flat Head Brass	..... dis 49
Round Head Brass	..... dis 50
Flat Head Steel	..... dis 51
Hand Rail	..... dis 10
Coach or Lag	..... dis 52
Round Head Steel	..... dis 53
Bed	..... list net
English—Flat Head Iron	..... dis 54 1/2
Blood's German Steel, Grains	
"Cast	..... dis 20 1/2
"Brass	..... dis 21
"German	..... dis 22
"Orain	..... dis 23
"Cast	..... dis 24
"Round Head & Rover	..... dis 25
"Young Amer.	..... dis 26
"Silver Clipper	..... dis 27
Scythe Teeth	..... dis 28
Shears	
Cast Steel	..... dis 29 1/2
Rowley's Cutlery Co., new brand	..... dis 30
Rowley's	..... dis 31
Shovels and Spades	
American	..... new list dis 10 1/2
Iron	..... dis 11
Old Colony	..... new list dis 12 1/2
N. B. Sherman	..... old list dis 13 1/2
Shovels and Tongs	..... list net
Iron Head	..... dis 14
Polished Steel	..... new list dis 15
Slaters	
Square Frames, Round Cornered, by case	..... dis 16 1/2
Iron	..... dis 17
Oval Frames, by case	..... dis 18 1/2
Less than a case	..... dis 19
Sponges	
Iron	..... new advanced list, dis 10 1/2
By the case	..... dis 11
Plated A 1	..... revised list dis 12 1/2
German Silver	..... revised list dis 13 1/2
Steel	..... dis 14
Tab.	..... \$1.50 gross, net
Tables and Disks	..... 7 1/2 net
Stove Polish	
Joseph Dixon's	..... dis 15 1/2
National	..... dis 16
Squares	..... dis 17
Steel	..... dis 18 1/2
Nickel Plated	..... dis 19 1/2
Square and T. Beran	..... dis 20 1/2
Squares and Scales	..... dis 21 1/2
Tacks	
Full Weight American Iron	..... dis 22 1/2
Carpet	..... dis 23 1/2
Full Weight American Half Weight	..... dis 24 1/2
Flaming Nails	..... dis 25 1/2
Trunk and Clout	..... dis 26 1/2
Copper	..... dis 27 1/2
Iron Shoe Nails	..... dis 28 1/2
Domestic	..... dis 29 1/2
Tapes, Measuring	
American Tack and Cap Co.	..... dis 30 1/2
Toe Calks	..... dis 31 1/2
Champion	..... dis 32 1/2
Peak, Slow & Wilcox	..... dis 33 1/2
Camel's Foot	..... dis 34 1/2
P. S. & W.	..... list net
Traps	
Newcomb	..... dis 35 1/2
Hutchins	..... dis 36 1/2
Peak, Slow & Wilcox	..... dis 37 1/2
W. H. P.	..... dis 38 1/2
Vices	
Trenton Vices, Solid Box	..... dis 39 1/2
100 and over	..... dis 40 1/2
Peter Wright's	..... dis 41 1/2
100 to 150 lbs.	..... dis 42 1/2
150 to 200 lbs.	..... dis 43 1/2
100 and upward	..... dis 44 1/2
Beck's	..... dis 45 1/2
Buffalo, Parallel	..... new list dis 46 1/2
Fisher & Norris' Double Screw Parallel	..... dis 47 1/2
W. H. P.	..... dis 48 1/2
Wire	
Bright and Annealed	..... No. 0 1/2 dis 49 1/2
Coppered	..... dis 50 1/2
Galvanized, No. 18 to 16	..... dis 51 1/2
Tinned	..... dis 52 1/2
Tinned Broom Wire	..... dis 53 1/2
Galvanized Telegraph, No. 8 and 9	..... dis 54 1/2
10 and 11	..... dis 55 1/2
Annulated Fence, No. 8 and 9	..... dis 56 1/2
Fence Staple	..... dis 57 1/2
Staple Steel Wire	..... dis 58 1/2
Wrenches	
American Adjustable	..... dis 59 1/2
Master's Adjustable "8"	..... dis 60 1/2
Diagonal	..... dis 61 1/2
Collins & Co.	..... dis 62 1/2
Oves Genuine	..... dis 63 1/2
Pattern (Wright)	..... dis 64 1/2
Indy's Patent	..... dis 65 1/2
Tally's Patent	..... dis 66 1/2
Charles Stamps	..... new list dis 67 1/2
TIN WARE	
STAMPED TIN WARE	
Wash Basins, Handled, Plain Stamped	..... dis 68 1/2
Wash Basins, Handled, Retained	..... dis 69 1/2
Wash Basins, Handled, Retained	..... dis 70 1/2
Wash Basins, with Feet, Plain Stamped	..... dis 71 1/2
Wash Basins, with Feet, Retained	..... dis 72 1/2
Wash Basins, with Feet, Retained	..... dis 73 1/2
Wash Basins, stamped	..... dis 74 1/2
Shallow	..... dis 75 1/2
Per doz	..... dis 76 1/2
Per doz	..... dis 77 1/2
Per doz	..... dis 78 1/2
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**Metallurgical.**

**MAYNARD & VAN RENSSLAER,**  
CONSULTING  
Mining and Metallurgical  
**ENGINEERS,**  
Experts in Iron and Analytical Chemists  
24 Cliff Street, NEW YORK,  
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And Consulting Metallurgist,  
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These processes produce "from ordinary coke pig iron the purest iron ever made," and which is equal to the highest class Swedish and Norwegian iron for Cast Steel and tools, and to Low Moor Iron for engineering purposes, and at less than one-half the cost of those irons.

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Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags & Coal for Practical Metallurgical Purposes.

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This Laboratory was established in 1866, at the instance of a number of practical Iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

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or determining the per cent. of pure Iron in an ordinary Ore..... \$4 00  
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For each additional constituent of usual occurrence..... 1 50  
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For determining the per cent. of Sulphur and Phosphorus in Iron or Steel..... 12 00  
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For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10 00  
For each additional constituent..... 9 00  
For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12 50  
For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charge will correspond with those for the constituents of an ore.  
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.  
Printed instructions for obtaining proper average samples for analysis furnished upon application.

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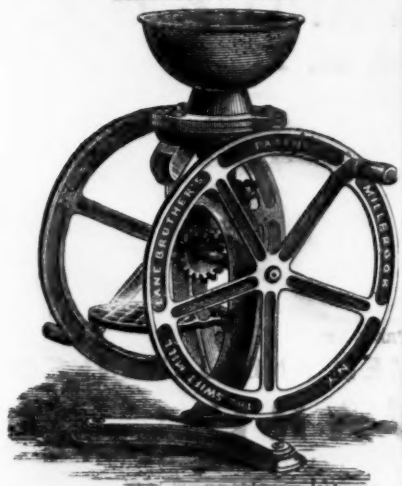
The plan of this school embraces a three years' course for the degree of ENGINEER OF MINES, or BACHELOR OF PHILOSOPHY.

For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plane Trigonometry. Persons not candidates for degrees are admitted to "short" examination, and may pursue any or all of the subjects taught. The next session begins October 2nd. The examination for admission will be held on June 25th and September 24th, 1874. For further information and catalogue, apply to

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## The Swift Mill.

Established in 1845.



Letter "B" Geared Counter Coffee or Spice Mill.

Stands nearly 2 1/2 feet high. Is highly finished, colored deep Vermilion and Gold. We make more than 50 different styles and sizes.  
Send for catalogue. Manufactured exclusively by  
**LANE BROTHERS Millbrook, N. Y.**

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Manufacturers of  
**L. COES' Genuine Improved PATENT SCREW WRENCHES,**  
Worcester, Mass.

Our Mr. L. Coes, formerly senior member of the firm of L. & A. G. Coes, established in 1839, is the Original Inventor of the Screw Wrench, and has, by making the bar wider, where the strain comes most severe, and screwing a nut up firmly against four square shoulders inside the ferrule, thereby effectually preventing the ferrule from being thrust back into the handle or getting loose, and making a larger screw than in the old wrench, fully succeeded in making a 12 inch wrench stronger than a 15 inch made in the usual manner. All sizes are made in this way, and are undoubtedly the strongest and best finished Screw Wrenches in the market.

There are *imitations* of our goods offered for sale, that, without question, infringe on our Patents.

We hold Patents bearing date Nov. 10th, 1863 (re-issued June 1st, 1869), June 26th 1866, March 25th 1869 (re-issued April 12th, 1870, and May 14th, 1873), which fully cover all our improvements. One of the above cuts represents a sectional view, showing the nut under the ferrule, and the strengthened bar, that part being covered by the aw, as seen in the cut of wrench complete. None genuine unless stamped

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Worcester, Mass.

"Easily Applied and not Liable to get out of Order."—From Report of Judges at American Institute Fair, 1873.

**CHALLENGE DOOR & GATE SPRING.**  
PATENTED JULY 11<sup>th</sup> 1871.

**The Challenge Door Spring Co.,**  
Patented Exclusive Manufacturers of the (March 4, 1873).

**CHALLENGE DOOR & GATE SPRING.**  
PATENTED JULY 11<sup>th</sup> 1871.

In Appearance the Most Beautiful. In Action the Most Graceful. In Use the Most Reliable.

The Challenge Springs are manufactured from Steel Wire, tempered by an improved process, the result of repeated experiments, and must not be classed by dealers with the numerous worthless "Coil Springs" made from common Bed Spring Wire.

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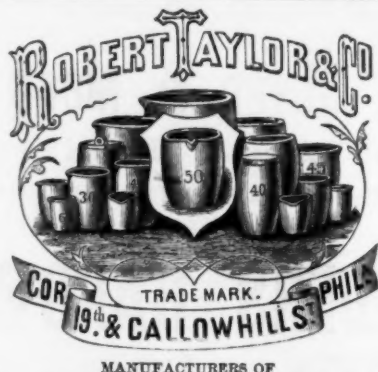


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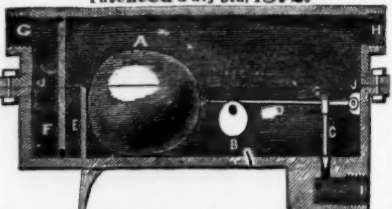
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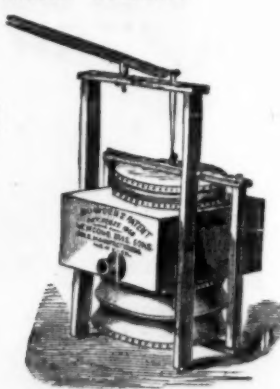
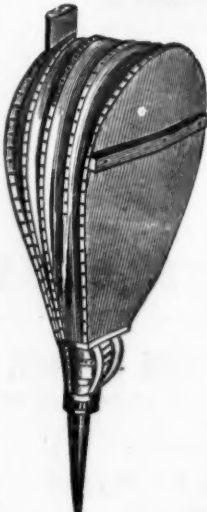
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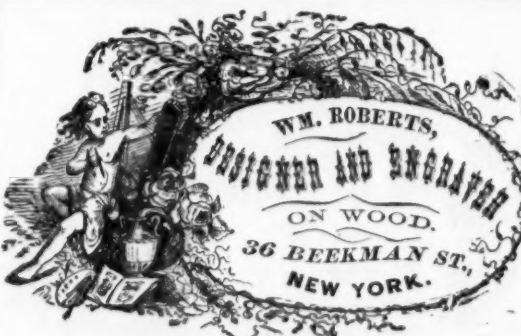
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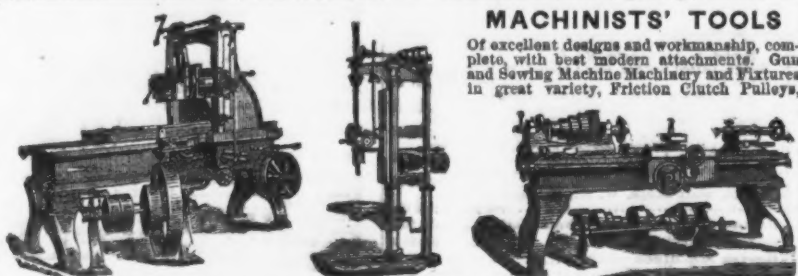
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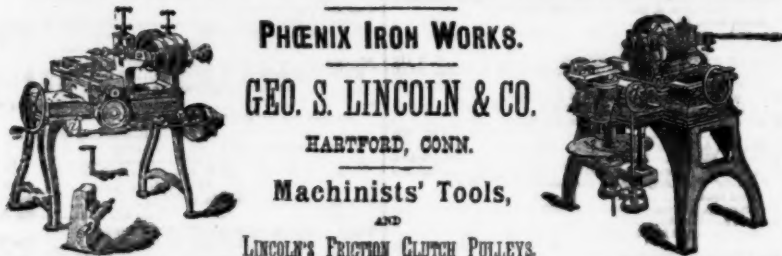
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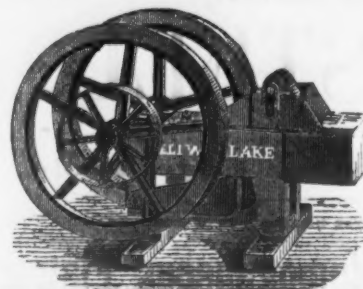
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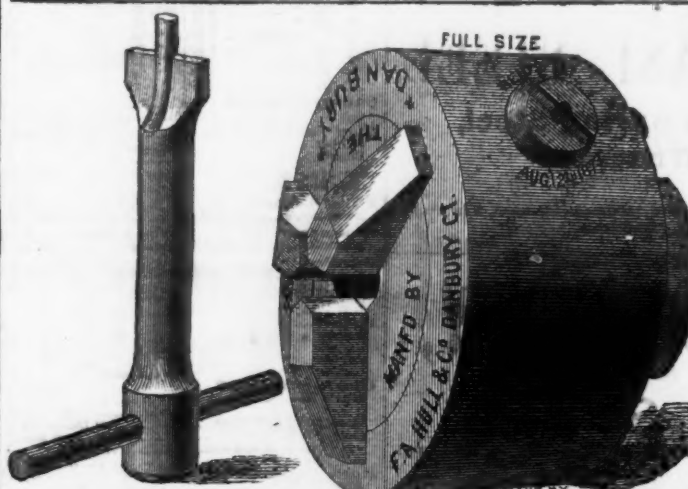
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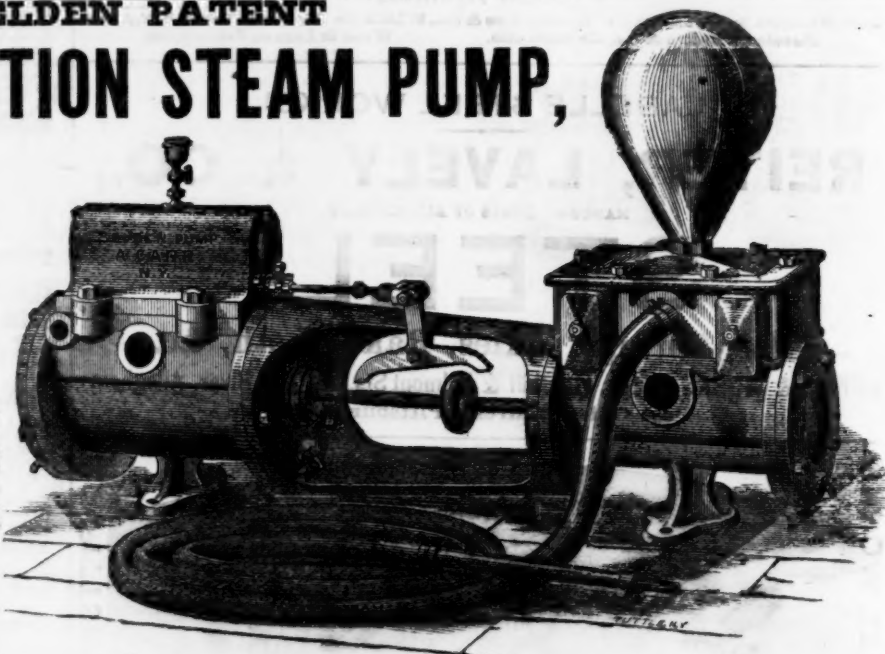
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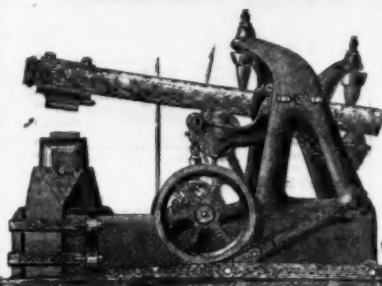
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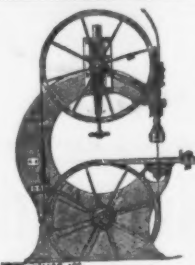
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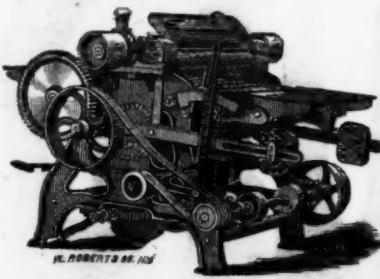
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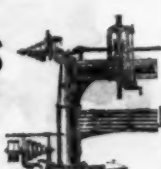
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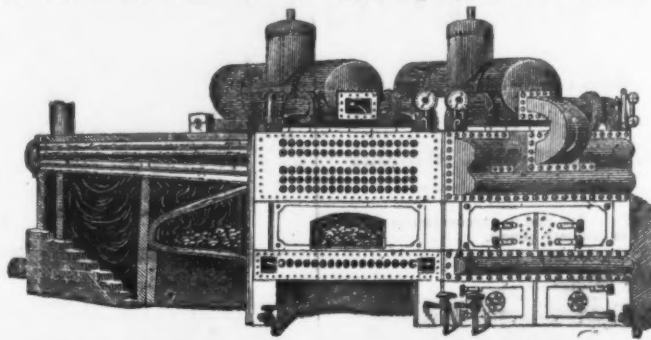
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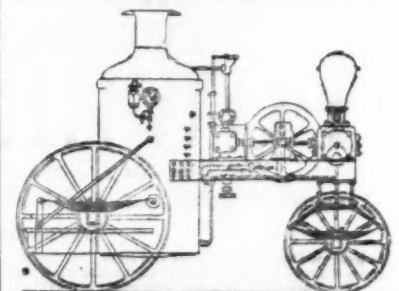
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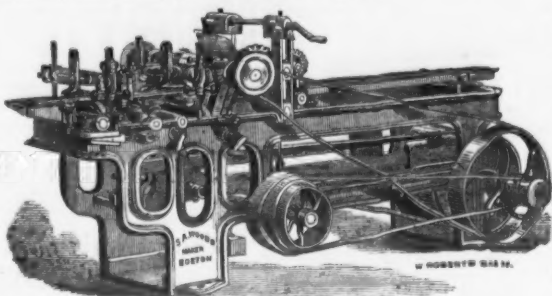
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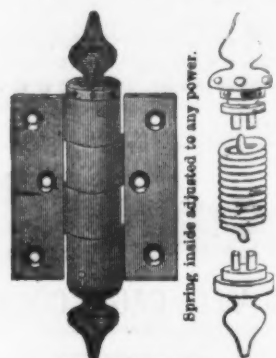
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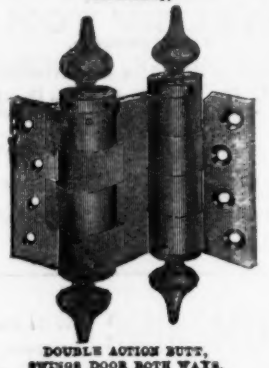
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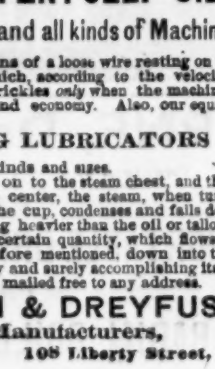
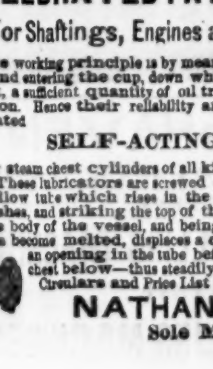
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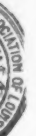






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